

Plaintiffs' Exhibit 8

(Redacted)

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA**

Alexandria Division

UNITED STATES, et al.,)	
)	
Plaintiffs,)	
v.)	No. 1:23-cv-00108-LMB-JFA
)	
GOOGLE LLC,)	
)	
Defendant.)	

**DECLARATION OF ROBIN S. LEE
IN SUPPORT OF PLAINTIFFS' OPPOSITION TO
GOOGLE'S MOTION FOR SUMMARY JUDGMENT**

Robin S. Lee, PhD., being duly cautioned, declares as follows:

1. I am over 21 years old and am competent to testify about the matters in this Declaration based on my personal knowledge.
2. Attached hereto as Exhibit A is a true and correct copy of the December 22, 2023, Expert Report of Robin S. Lee, PhD. Attached hereto as Exhibit B is a true and correct copy of the February 13, 2024, Expert Rebuttal Report of Robin S. Lee, PhD, along with associated errata. Attached hereto as Exhibit C is a true and correct copy of the March 4, 2024, Expert Supplemental Report of Robin S. Lee, PhD.
3. I authored the attached Expert Reports identified in Item (2) above and understood at the time I signed them that they were being prepared for use in this litigation. I am prepared to testify at trial, under oath, to the matters set forth in these reports. My statements set forth in these reports, as modified by associated errata, are true and correct to the best of my knowledge.
4. The exhibits attached to the reports described in Item (2) are true and correct copies.

I declare under penalty of perjury that the foregoing statements in this Declaration are true and correct.

Dated: *May 10, 2024*

Signed: 

Robin S. Lee, PhD.

County and State: *SUFFOLK COUNTY, VA*

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
Alexandria Division**

United States of America, *et al.*,

Plaintiffs,

v.

Google LLC,

Defendant.

Case No. 1:23-cv-00108-LMB-JFA

Hon. Leonie H. M. Brinkema

EXPERT REPORT OF ROBIN S. LEE, PHD

December 22, 2023

Expert Report of Robin S. Lee, PhD

that I relied upon in forming my opinions. I reserve the right to incorporate new materials or data into my analysis, if and when they become available.

- (11) Bates White is compensated at a rate of \$765 per hour for my work in this matter. Neither Bates White's compensation nor my compensation is in any way contingent on the outcome of this case.

I.D. Summary of opinions

- (12) I have reached the following opinions in this matter:
1. Publisher ad servers, ad exchanges, and advertiser ad networks that serve and transact open-web display advertising are relevant antitrust product markets for evaluating Google's market power and the competitive effects of the conduct that is the focus of my report. For each relevant product market, both worldwide (excluding a limited number of countries and regions, including the People's Republic of China) and the United States are relevant geographic markets.
 2. Google possesses substantial market power in each of the relevant markets, protected by significant barriers to entry. It has possessed that market power in each of the relevant markets in recent years, and likely since at least 2015.
 3. Google has used its market power within and across the relevant markets to exclude competitors from participating in these markets, and to impede their ability to compete for customers. Google has done so by:
 - (1) Providing unrestricted access to Google Ads' advertiser demand exclusively to its AdX ad exchange, and denying comparable access to rival ad exchanges;
 - (2) Providing access to and use of real-time bids from AdX exclusively to its DFP publisher ad server, and denying comparable access to rival publisher ad servers;
 - (3) Providing access to a feature known as "Dynamic Allocation" exclusively to AdX within DFP, granting AdX valuable "first-look" and "last-look" advantages over rival ad exchanges;
 - (4) Eliminating publishers' ability to use variable pricing floors within DFP, impairing their ability to work with rival ad exchanges and exert competitive pressures on AdX;
 - (5) Acquiring an emergent competitor, AdMeld, and eliminating it as a competitive threat to Google's AdX and DFP products.
 4. These actions have harmed and continue to harm the ability of rival publisher ad servers, ad exchanges, and advertiser ad networks to compete for advertiser spending and publisher impressions. These actions have also denied scale to Google's rivals in each of the relevant markets, which is important for the competitiveness of ad tech products.

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5. Google's actions harm competition and have enhanced and maintained Google's market power in the relevant markets. Google's actions have also harmed open-web display publishers and advertisers, and have also likely harmed consumers.

I.E. Summary of report

- (13) Competition encourages firms to provide higher quality and lower priced products, and to innovate and adapt in ways that create customer value. For these reasons, competition policy in the United States seeks to preserve competition by prohibiting firms from using their established dominance to distort or impede competition and block competitive threats from rivals, while preserving incentives to improve products in ways that benefit customers.
- (14) *Monopolization* refers to conduct that creates or maintains a firm's substantial market power over its products by harming competition. The most common methods of monopolization undermine the ability of customers to transact freely with rivals, and the ability of rivals to serve those customers' needs. These methods typically exclude rivals from competing for segments of a market by hindering customers from using their products, depriving them of or degrading access to important inputs, raising their costs of operation, or worsening the quality of their products.
- (15) In this report, I conduct an economic inquiry into whether Google has engaged in (and continues to engage in) conduct that harmed competition and served to acquire, maintain, or enhance Google's market power over technology products used to transact open-web display advertising on websites ("ad tech products"). The customers potentially impacted by its actions are *open-web publishers* (website operators that do not own and operate their own ad-tech products) and *advertisers* seeking to transact open-web display advertising.
- (16) My economic inquiry involves four steps:
 1. First, determining whether Google's conduct excluded existing or potential rivals from, or impeded their ability to compete for, publisher impressions and advertiser spending, thereby harming their competitiveness;
 2. Second, evaluating whether Google's conduct preserved or enhanced Google's market power;
 3. Third, evaluating whether Google's conduct has harmed customers (open-web publishers and advertisers);
 4. Last, examining whether pro-competitive justifications for the scrutinized conduct exist. If so, then investigating whether any pro-competitive benefits could have been realized via less-restrictive or less-exclusionary means (in which case such benefits are not specific to the

II.A.1. Ad tech products for display advertising and their customers

- (51) “Ad tech,” short for advertising technology, refers to software and other tools used to purchase, sell, and manage digital display advertising. I refer to companies offering ad tech products as ad tech intermediaries.
- (52) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Because advertisers are buyers and publishers are sellers of display ad inventory, advertisers are said to be on the “demand-side” (or “buy-side”) while publishers are on the “supply-side” (or “sell-side”).
- (53) A variety of ad tech products work in conjunction with one another to facilitate display advertising transactions between publishers and advertisers. These products form what is known as the “ad tech stack.” At a high level, the ad tech stack can be described as comprising three “layers” consisting of ad tech products that each serve different functions:
- publisher ad servers;
 - ad exchanges; and
 - advertiser bidding tools, comprising both demand-side platforms (“DSPs”) and advertiser ad networks.²⁹
- (54) The purchase of a single online display ad “impression” (i.e., a single display ad shown to a single web visitor) by an advertiser from a publisher often involves participation by products in each of these layers. I describe these ad tech products in more detail in Section II.B.
- (55) The focus of this report is ad tech products for display ads that are shown on websites, so unless otherwise specified, I will use the term *publishers* to refer to entities that operate online web pages and display content to web visitors. These publishers often monetize their web traffic by devoting some of the space on their web pages to display advertising. I will use the term *open-web publishers* to refer to those publishers that rely on third-party ad tech products (i.e., products that these publishers do not themselves own) to sell their display ad inventory.³⁰ [REDACTED]
[REDACTED]

²⁸ There are some forms of display ads that do not appear on websites, a notable example being in-app display ads. As I explain in Section IV, in-app ads are a distinct form of advertising from open-web display ads. Google also distinguishes between display, video, and in-app inventory. [REDACTED]

²⁹ Certain ad networks can also be used to connect advertisers and publishers without relying on exchanges or publisher ad servers. See Section II.B.2.b.

³⁰ Unless otherwise specified, I use “publishers” in this report to mean “open-web publishers,” as these are the publisher customers of the ad tech products that are the focus of this report.

[REDACTED]

[REDACTED]

[REDACTED]

- (56) In my report, I use “open-web display advertising” to refer to display ads shown on the websites (which can be viewed on desktop or mobile devices) of open-web publishers. This excludes other forms of digital advertising (including search and instream video), and display ads that are shown in applications used on mobile devices or on TV media players.³² Similarly, unless otherwise specified, I use the term *advertisers* in this report to refer to entities that purchase display advertising inventory.
- (57) Even though website visitors and hence viewers of display ads (“users” or “consumers”) are not direct customers of ad tech products, they too can be affected by changes in the quality or cost of display advertising. For example, users may benefit if display ads become more “relevant,” which can mean that ads more frequently contain valuable information for consumers. They may also benefit if increased monetization from display advertising allows publishers to fund the creation of new content. On the other hand, users can be made worse off if display advertisements become less relevant, rely on more personal data, become more expensive and lead to higher final prices of goods or services, or if publishers earn less from the sale of online display inventory and therefore are less able to produce valuable content.

II.A.2. Uses of different forms of digital advertising

- (58) [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED] These and other roles played by advertising are often described by marketers as corresponding to different stages of a consumer’s “journey” toward making a purchase. Marketing

³¹ [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

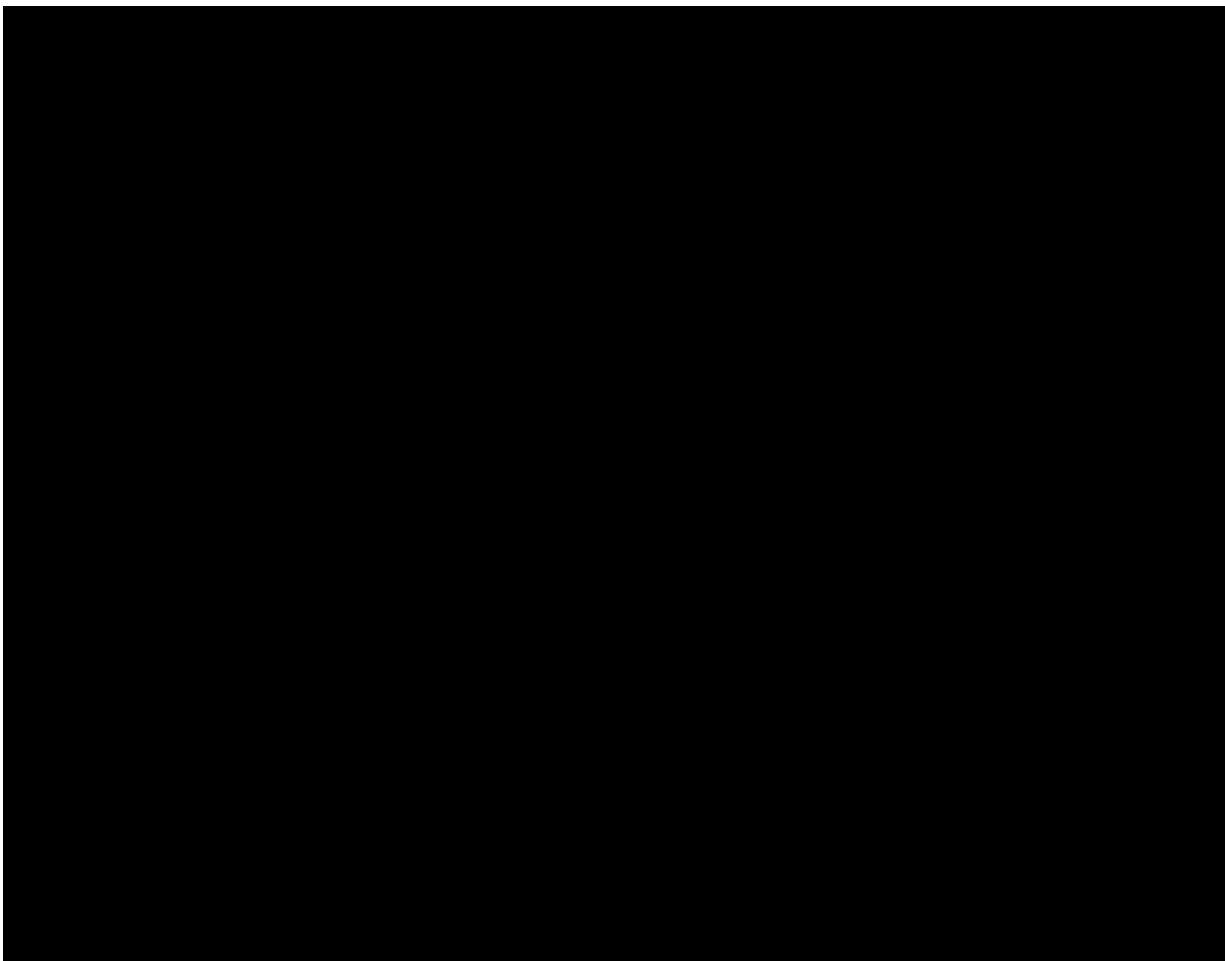
[REDACTED]

³² Apple and Android smartphones and tablets are examples of mobile devices, and Roku, AppleTV, Amazon’s Fire TV, and Google’s Chromecast are examples of TV media players.

³³ Philip Kotler and Kevin Lane Keller, *A Framework for Marketing Management*, 6th ed. (Pearson Education, 2016): 122. (“Some people are unaware of the product, some are aware, some are informed, some are interested, some desire the product, and some intend to buy... [M]arketers can employ a marketing funnel to break the market into buyer-readiness stages.”). [REDACTED]

[REDACTED] See also Amazon Ads, “What is a marketing funnel? How they work, stages, and examples,” Amazon Ads, accessed December 18, 2023, <https://advertising.amazon.com/library/guides/marketing-funnel> (describing a “four-stage marketing funnel” including the stages of “awareness, consideration, conversion, and loyalty.”)

Figure 17. [REDACTED]
[REDACTED]



II.B. Ad tech products used for web display advertising

(79) Multiple ad tech products, or “components,” are used by publishers and advertisers to serve, manage, and transact display advertising.

(80) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

- (101) [REDACTED]
- (102) Ad networks, like Google’s Display Network with *AdSense*, may also have a publisher-facing component used by open-web publishers to sell display inventory. I describe AdSense in further detail in Section II.C.3.b below.

II.B.3. Ad exchanges

- (103) Ad exchanges (also previously referred to as supply side platforms, or “SSPs”) are software products that run real-time auctions for publishers’ display ad inventory.^{114, 115} Publishers can sell display ads through ad exchanges via a publisher ad server, and advertisers can bid on those impressions using DSPs and advertiser ad networks.

- (104) [REDACTED]

¹¹² A 2018 Google document describes Criteo as a “[c]ompetitive performance ad network” and lists Facebook Ads (no longer active in open-web display) as the only other display ad network competitor. *See* [REDACTED] *See* Section V.D.

¹¹³ Allison Schiff, “Facebook is Killing Off Its Web Supply In Audience Network – And Don’t Be Surprised If It All Shuts Down,” *adexchanger*, February 5, 2020, <https://www.adexchanger.com/platforms/facebook-is-killing-off-its-web-supply-in-audience-network-and-dont-be-surprised-if-it-all-shuts-down/>. *See also* Meta, “Changes to Web and In-stream Placements,” <https://www.facebook.com/business/help/645132129564436>; Meta, “Meta Audience Network,” <https://www.facebook.com/audiencenetwork/> and discussion in Section V.B.2.b.

¹¹⁴ While previously distinct, SSPs and ad exchanges today are often used to refer to the same set of products. GOOG-DOJ-04429792 (“Monetization Cheatsheet” presentation) at -795 (03/27/2017) (“Sell Side Platform (SSP)/Exchange – service for managing multiple programmatic monetization sources of online display inventory, DSP and ad networks are considered ‘Buyers’, and publishers and publisher networks are considered ‘Sellers’. Google Exchange is called AdX”).

[REDACTED] Often SSP and Exchange are bundled as one product and both names are used interchangeably”); Ryan Joe, “Defining SSPs, Ad Exchanges and Rubicon Project,” *AdExchanger*, Feb. 7, 2014, <https://www.adexchanger.com/yield-management-tools/defining-ssps-ad-exchanges-and-rubicon-project/> (“The distinction between an ad exchange and a supply-side platform (SSP) has become muddled as the once disparate but complementary technologies have merged.”). *See also* Michal Wlosik and Maciej Zawadzinski, “What is a Supply-Side Platform (SSP) and How Does It Work?,” *Clearcode*, October 18, 2018, <https://clearcode.cc/blog/what-is-supply-side-platform/>.

¹¹⁵ While certain exchanges such as Google’s AdX have begun to facilitate programmatic direct transactions, ad exchanges have primarily fulfilled indirect deals via RTB auctions. In 2022, fewer than 4% of impressions and less than 14% of spend transacted by exchanges that produced data sufficient to identify transaction type in this matter were transacted through direct transactions.

¹¹⁶ [REDACTED]

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[REDACTED]
[REDACTED]
[REDACTED]

(105)

[REDACTED]
[REDACTED]

[REDACTED]

(106)

[REDACTED]

117 [REDACTED]

[REDACTED] *See also* Irina Kovalenko, “What is an Ad Exchange?,”
Programmatic 101, January 30, 2017 <https://smartyads.com/blog/what-is-an-ad-exchange/>.

119 Google, “Protections overview,” Google Ad Manager Help, accessed December 18, 2023,
<https://support.google.com/admanager/answer/2913553>.

120 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Section III.E for additional detail.

121 [REDACTED]
[REDACTED]
[REDACTED]

122 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

display advertising is differentiated from other forms of advertising from advertisers' perspectives.

- In Section IV.B.3, consistent with the above, I show evidence that Google and other industry participants recognize important distinctions between open-web display advertising and other forms of advertising.
- In Section IV.B.4, I discuss why indirect transactions, and RTB transactions in particular, for open-web display advertising provide additional distinct value to publishers and advertisers compared to direct transactions.

IV.B.1. Open-web display advertising is an important and distinct form of monetization for publishers

- (265) Open-web publishers relying on advertising to monetize their digital content often use a portfolio of different forms of advertising.³⁵² In this Section, I discuss why open-web display advertising forms an important part of the monetization portfolio for open-web publishers, and why such publishers will tend to have limited ability to substitute away from display advertising to other forms of advertising. I also discuss why open-web publishers without their own integrated ad tech products cannot easily substitute to using integrated advertising tools to sell display advertising.
- (266) Note that open-web publishers that monetize at least some of their web inventory via digital advertising would not likely find substituting completely away from advertising to a consumer-payment model (e.g., subscriptions) to be a close substitute. For publishers that do not currently have a consumer-payment model, adopting a new monetization strategy can be costly and difficult.³⁵³ In particular, a publisher that attempts to adopt a consumer-payment model from scratch must induce consumers to pay for its content, market its product to new customers, and deliver enough value to keep its customers paying. For publishers that already have a consumer-payment model, substituting completely away from advertising would mean forgoing a valuable source of additional revenue.

IV.B.1.a. The sale of display advertising is distinct from other forms of advertising from the perspective of open-web publishers

- (267) From the perspective of open-web publishers, the sale of display advertising is distinct from selling other forms of advertising. There are two primary reasons for this. First, a publisher may not have content that is suitable for other forms of advertising, such as instream video or in-app content.

³⁵² See Section IV.A.2.

³⁵³ As one academic paper notes, so-called “free-to-free” changes between advertising to subscription-based models are challenging for publishers because of the tendency of consumers to place a lower value on free (or discounted) content and resist paying for content that had been free (or discounted). Pontus Huotari and Paavo Ritala, “When to Switch between Subscription-based and Ad-sponsored Business Models: Strategic Implications of Decreasing Content Novelty,” *Journal of Business Research* 129 (2021), 14–28.

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Second, even among the set of advertising options available to a publisher given its content, there is significant differentiation between display advertising and other forms of advertising.

IV.B.1.a.i. Publishers' advertising options are limited by the content they provide

(268) A publisher's options for using advertising to monetize a particular piece of online content is limited by the nature of the content itself.

(269) Perhaps most obviously, a publisher with *online* content cannot generally sell *offline* advertising to directly monetize that online content. Similarly, publishers cannot monetize their *web* properties by selling *in-app* ads.³⁵⁴ Offline and in-app ads fundamentally monetize different advertising inventory than web ads.

(270) [REDACTED]

IV.B.1.a.ii. Display advertising is differentiated from other available options from a publisher's perspective

(271) Even for publishers who have advertising options other than display advertising for the content they offer, display advertising is significantly differentiated from other forms of digital advertising.

(272) **Instream Video.** [REDACTED]

³⁵⁴ Many online publishers also do not have a mobile app: Google data show that in 2022, 83% of AdX web publishers sold no mobile app or tablet app impressions (Google XPP-D data (DOJ RFP 7)). This figure excludes transactions where Google sold its owned-and-operated inventory through AdX.

³⁵⁵ [REDACTED]

[REDACTED]

(273) [REDACTED]

(274) These price differences are consistent with instream video and display ads not being close substitutes from publishers' perspectives, and there being constraints on publishers' abilities to re-allocate their advertising space away from display ads and toward instream video ads to take advantage of the higher monetization rate.

(275) **In-app.** As discussed above, even for publishers that have both a mobile application and a web site, in-app and open-web display advertising are not close substitutes. This is primarily because *in-app* display ads cannot monetize the publisher's *web* inventory (and vice versa); such a publisher would likely use both in-app and open-web display ads if it chose to monetize its digital properties with display advertising. Additionally, web impressions and app impressions for such publishers may attract different audiences and users.³⁵⁹ [REDACTED]
[REDACTED] Forgoing open-web advertising would mean forgoing additional advertising sales for those web impressions.

356 [REDACTED]

357 [REDACTED]

358 [REDACTED]

³⁵⁹ See Section II.A.2, IV.B.1.a, IV.B.2.b.

³⁶⁰ Google XPP-D data (DOJ RFP 7).

(276) **Native.** [REDACTED]
[REDACTED]
[REDACTED]

(277) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Similarly, in-feed native ads are distinct from display ads because they occupy slots *within* (as opposed to above and around) publishers' content.³⁶³

(278) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

361 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

362 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

363 See Section II.A.

364 [REDACTED]
[REDACTED]
[REDACTED]

365 Google, "About ad units," Google AdSense Help, <https://support.google.com/adsense/answer/9183549>. See also [REDACTED]
[REDACTED]
[REDACTED] Per Google, "Traffic Multiplex ads (retired)," Google Ad Manager Help, <https://support.google.com/admanager/answer/9428537?hl=en>, (Multiplex was

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[REDACTED]

IV.B.1.b. Open-web publishers cannot easily substitute to selling display advertising inventory with their own integrated advertising tools

- (279) Open-web publishers rely on third-party ad tech products to sell their ad inventory. [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

retired in July 2023).

366 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

369 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

370 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- (418) Dr. Respass calculates that Google's operating profit in the DVAA product area (excluding AdMob) increased from \$312 million in 2020 to \$1.185 billion in 2022.⁵⁹¹ Dr. Respass's calculations also show negative accounting profits from 2015–2017. As a general matter, negative accounting profit (which are not based on economic opportunity costs) does not rule out the possession of substantial market power. For example, firms with substantial market power may invest profits today in order to entrench their market power and recover greater returns in the future.⁵⁹²
- (419) Given the general difficulties in comparing economic profits and accounting profits discussed above, and the challenges with mapping Google's profits to the products contained in the relevant markets at issue in this matter, I do not rely on measures of accounting profit and instead rely on other indirect and direct evidence to evaluate Google's market power in the relevant markets.

V.A. Sources of Google's market power over its ad tech products

- (420) Because each of the relevant markets that I evaluate in this report are intertwined, and Google's market power in the relevant markets in part flows from Google's assets that lie both within and outside these markets, I begin by discussing key sources of Google's market power across the ad tech stack. I then discuss common economic factors that increase barriers to entry in each of the relevant product markets.

V.A.1. Google's key strategic assets

- (421) Google's substantial market power for its ad tech products derives from several key strategic assets that Google has leveraged within the ad tech stack. The presence of indirect network effects has amplified the importance of these assets.

[REDACTED]

⁵⁹² See Section VII.A.

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(422)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] (I discuss the importance of Google Ads' demand further below in Section V.D and in VII.B.)

(424) Third, DFP's publisher customers are "sticky" because it is very disruptive for them to change ad servers. The stickiness of publisher ad servers was recognized at the time of Google's DoubleClick acquisition.⁶⁰⁰ Through the DoubleClick acquisition, Google obtained a publisher ad server that already had a significant share of publisher customers, and these sticky single-homing publishers helped Google gain and continue to maintain market power in the publisher ad server market and elsewhere in the ad tech stack. (I discuss the importance of DFP for Google's market power in Section VII.A.)

(425) [REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
598 [REDACTED]. See Figure 117 in Appendix F.
599 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
600 See Sections V.B.1, II.E.2, and Appendix L.1.
601 AdSense publishers only have access to Google Ads advertisers and select Google-certified Ad Exchange buyers.
<https://support.google.com/admanager/answer/4599464?hl=en>. [REDACTED]
[REDACTED]
[REDACTED]
602 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

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uses significant amounts of historical data from within the ad tech stack to forecast future traffic volumes and to dynamically set reserve prices (i.e., price floors) across exchanges within DFP.⁶²²

V.B.2. Indirect evidence of Google's market power in the publisher ad server market

- (436) Google's high market shares, as well as evidence of significant barriers to entry, provide indirect evidence of Google's substantial and sustained market power in the publisher ad server market.

V.B.2.a. Market shares

- (437) [REDACTED]
- (438) [REDACTED]

⁶²² See Section III.D.3 for further details.

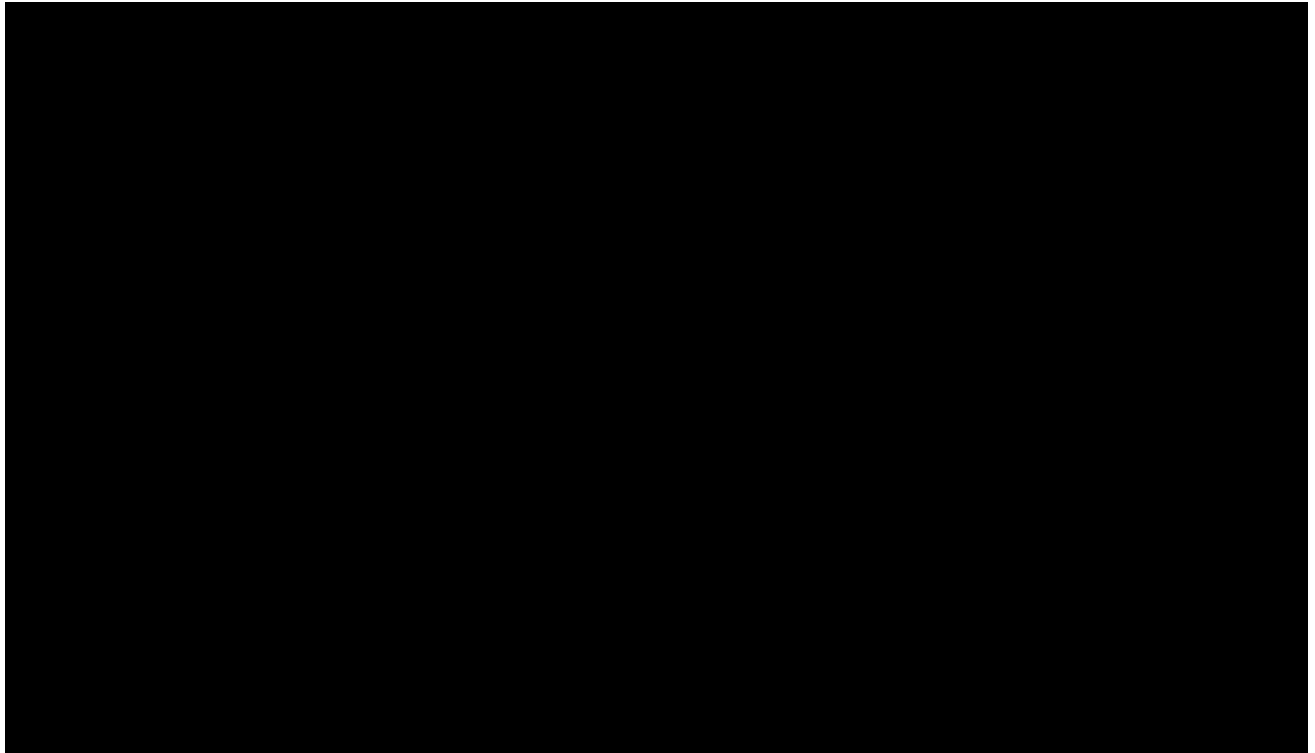
⁶²³ [REDACTED]

⁶²⁴ [REDACTED]

⁶²⁵ [REDACTED]

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Figure 41. [REDACTED]
[REDACTED]

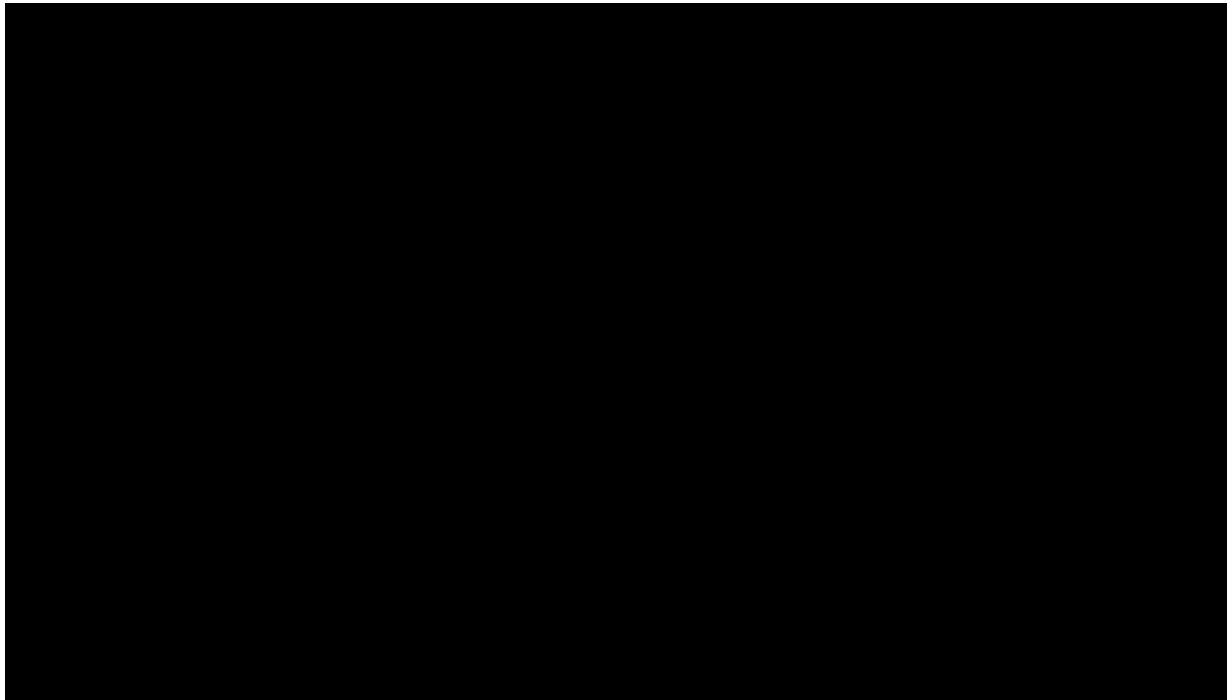


(439) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

626 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
627 [REDACTED]
[REDACTED]
[REDACTED]

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Figure 42. [REDACTED]



(440) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

628 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

V.B.3.b. Google is able to significantly deviate from competitive behavior in the publisher ad server market

- (461) Evidence that Google has substantial and sustained market power in the publisher ad server market includes its ability to meaningfully deviate from competitive behavior in that market without losing significant sales. In a competitive market, a firm loses significant sales if it degrades the quality of its product, all else equal.
- (462) [REDACTED]
- (463) [REDACTED]
- (464) Indeed, Google's refusal to allow DFP customers to work on equal terms with rival exchanges as with AdX significantly contributed to the rise of header bidding, which became widely used in the 2014-2015 period.⁶⁷⁴ It is notable that during this period, when DFP did not offer publishers the ability to place AdX in competition with real-time bids from rival ad exchanges, publishers resorted to using header bidding (with its associated limitations and complications) rather than switch to another alternative publisher ad server.⁶⁷⁵ [REDACTED]

⁶⁷¹ See Section II.

⁶⁷² [REDACTED]

⁶⁷⁴ See discussion in Section II.E.3 and Appendix L.2.

⁶⁷⁵ See Sections II.E.3 and Appendix L.2 and L.3 for additional discussion of header bidding.

[REDACTED]

- (465) Moreover, as I described above, when Google made Open Bidding broadly available in 2018, it charged 5-10% for use of this functionality, more than the cost of alternative header bidding tools (as discussed above). In a more competitive market, a rival publisher ad server alternative that enabled publishers to access multiple ad exchanges in real-time would likely have restricted Google's ability to profitably levy such a fee.

V.C. Google possesses substantial and sustained market power in the ad exchange market

- (466) Google's ad exchange, AdX, is the largest ad exchange for open-web display transactions, and possesses substantial market power. In this section,
- I first describe how AdX's market power derives in large part from its advantaged treatment by Google Ads and DFP (Section V.C.1).
 - I then provide measures of AdX's market shares and discuss barriers to entry and expansion in the ad exchange market (Section V.C.2). AdX is by far the largest exchange in the ad exchange market across a variety of measures. Among worldwide indirect open-web display transactions, I calculate that AdX has maintained a share of over [REDACTED]. Barriers to entry and expansion include significant fixed costs of building, maintaining, and starting an ad exchange; and overcoming network effect and data disadvantages relative to incumbents.
 - Last, I provide direct evidence of AdX's market power (Section V.C.3). [REDACTED] Google's own analyses also indicate that Google could profitably raise AdX's take rate above competitive levels. Moreover, Google's conduct, including its ability to dynamically adjust reserve prices (starting in 2015) and use AdX to favor its own products in the ad tech stack even while degrading the quality of AdX by not submitting real-time bids into rival publisher ad servers, also demonstrate AdX's substantial market power. Such conduct would not be sustainable in a competitive market, as customers would substitute away to comparable alternatives to an extent to make this conduct unprofitable.
- (467) Substantial barriers to entry and expansion in the ad exchange market have protected Google's dominant position, and allowed it to maintain a high take rate and take actions that degrade AdX's

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(475) [REDACTED]
[REDACTED]
[REDACTED]

V.C.2. Indirect evidence of Google's market power in the ad exchange market

(476) Google's high market shares across a variety of measures, as well as evidence of significant barriers to entry, provide indirect evidence of Google's substantial and sustained market power in the ad exchange market.

V.C.2.a. Market shares

(477) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(478) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

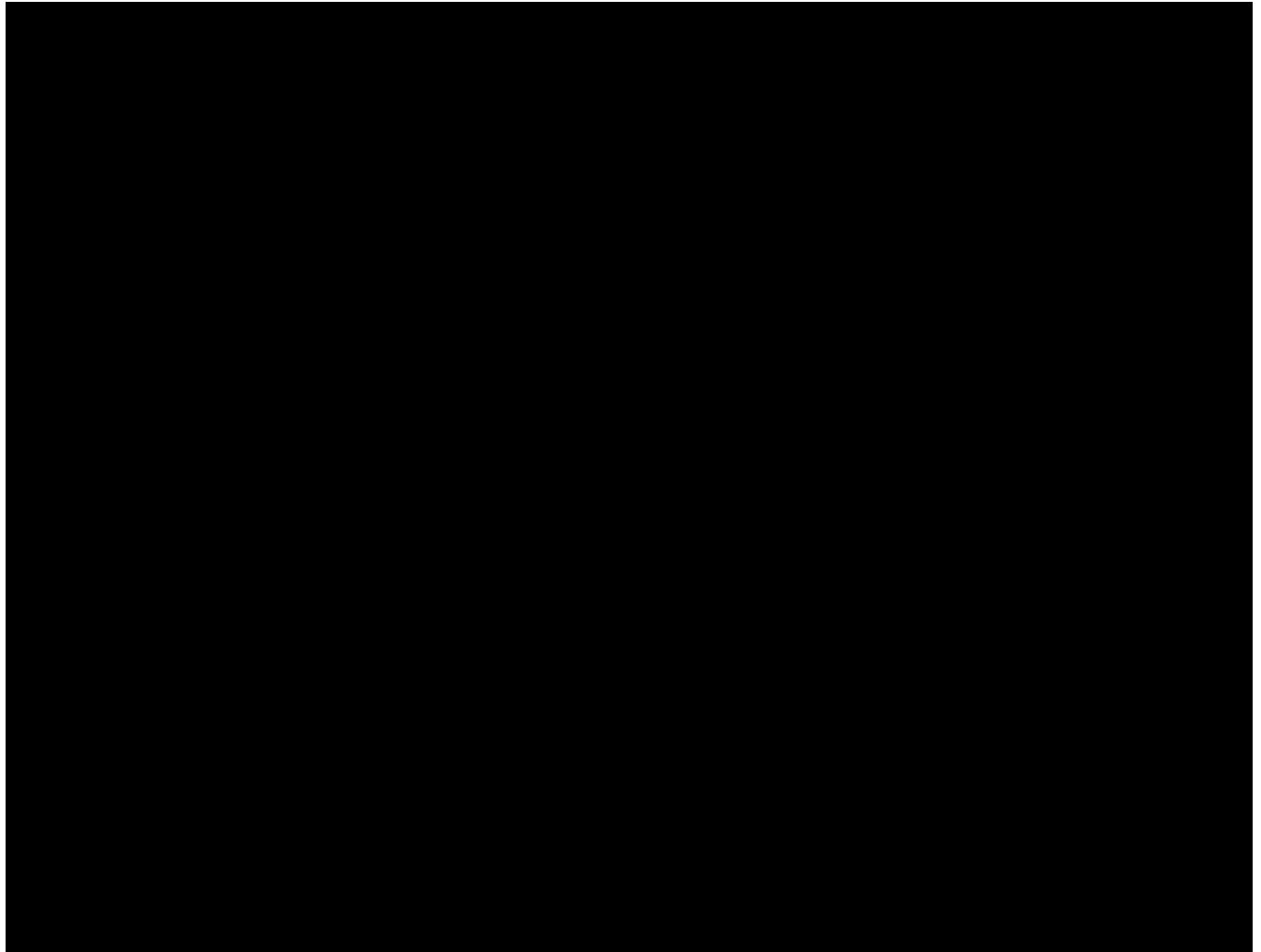
⁶⁸⁶ See Section III.D.1 regarding the persistence of network effects, and Sections VII.D and VII.F.1 regarding AdX's advantages within DFP.

[REDACTED]

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[REDACTED]

Figure 46. [REDACTED]



(479) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]

689 [REDACTED]
[REDACTED].

(480) Google's high share in the ad exchange market is also corroborated by data produced in this case. As I show below, market share measures are consistent with AdX possessing substantial and sustained market power in the exchange market.

(481) I present market shares based on impressions, or transactions served, by an ad exchange. As I discussed in Section III.D, via economies of scale and data, scale as measured by the volume of transactions handled by an ad tech product is important for an exchange's competitiveness.⁶⁹¹ [REDACTED]

[REDACTED] Although net revenue shares may reflect additional differences in ad tech products' ability to earn fees and returns on investment, they are less directly informative for competitive differences arising from scale effects.

(482) **Impressions.** [REDACTED]

(483) However, because I do not have access to data from all participants in the ad exchange market, the above share calculation does not contain transactions from those other ad exchanges and hence overstates AdX's share among all ad exchanges. To obtain a rough estimate of the number of transactions served through ad exchanges for which I do not have data, I perform the following calculation.⁶⁹⁴ First, I obtain the total number of worldwide indirect open-web display impressions that are purchased through ad exchanges from all bidding tools (DSPs and advertisers ad networks) that produced data sufficient to identify transactions by exchange. I compute that, in the years 2018 – 2022, the exchanges for which I have data represent approximately [REDACTED] [REDACTED] display transactions for this set of bidding tools, excluding DV360 and Google Ads (which meaningfully restrict bidding on non-Google ad exchanges). This figure is greater than [REDACTED] [REDACTED], although the ad exchanges that produced data comprise a substantial share of indirect

⁶⁹¹ [REDACTED]

⁶⁹² In Appendix D.1.c I also calculate spending (gross revenue) shares and show that they are similar to net revenue shares.

⁶⁹³ See Figure 88 in Appendix D.1.

⁶⁹⁴ I describe this calculation in more detail in Appendix H.

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open-web display transactions, there is still likely a meaningful share represented by other ad exchanges.

(484) Following the approach outlined above, I am able estimate the total number of indirect open-web display impressions in each month transacted through ad exchanges that did not produce data using data produced by DSPs and advertiser ad networks.⁶⁹⁵ I use these estimates to supplement data produced by ad exchanges and am thus able to estimate the total number of indirect open-web display impressions transacted by ad exchanges in each month.

(485) [REDACTED]

⁶⁹⁵ To estimate the total number of open-web display impressions transacted through ad exchanges that did not produce data on this matter, I use data produced by DSPs and advertiser ad networks that contains [REDACTED]

⁶⁹⁶ [REDACTED]

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Figure 47. [REDACTED]
[REDACTED]

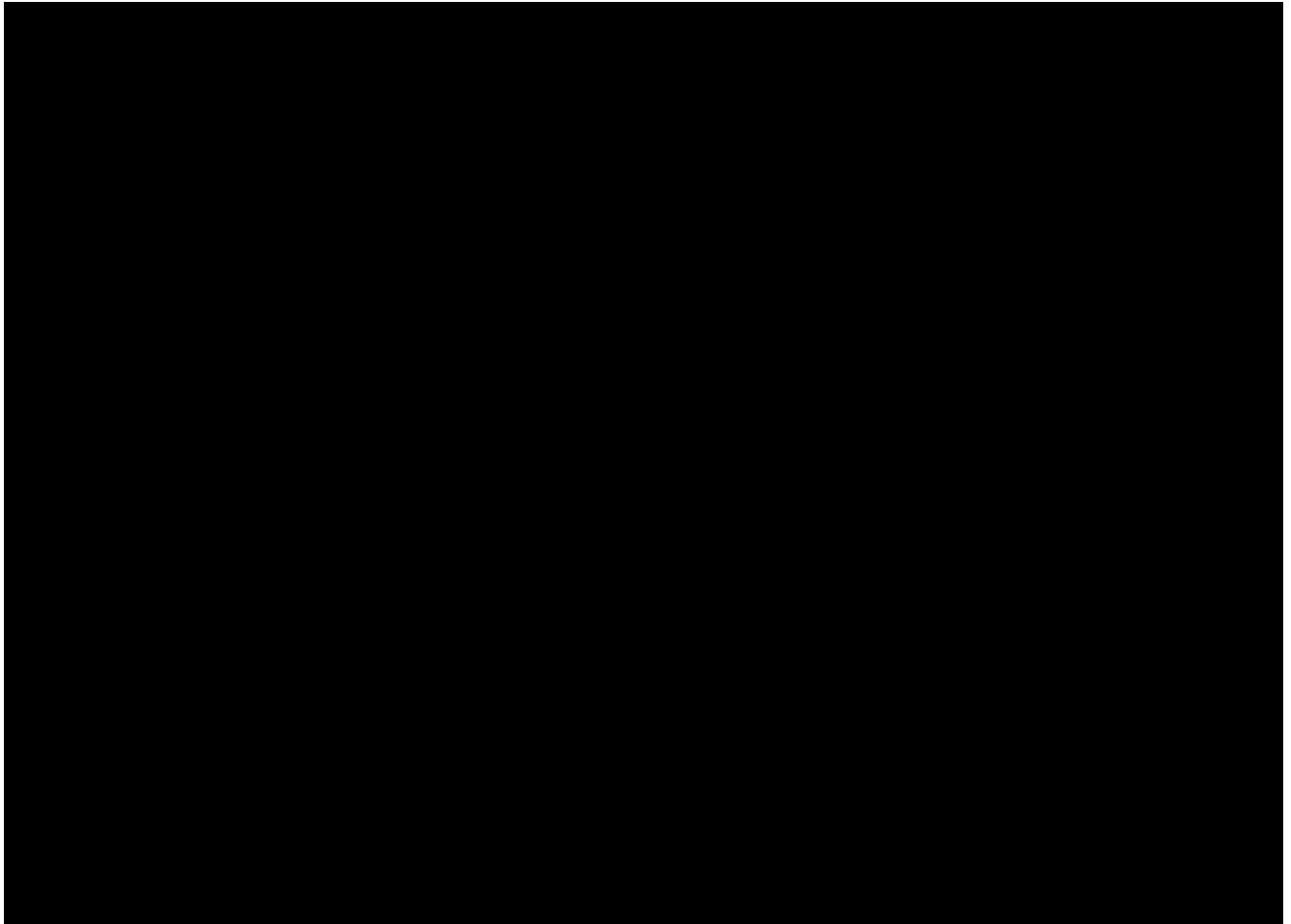
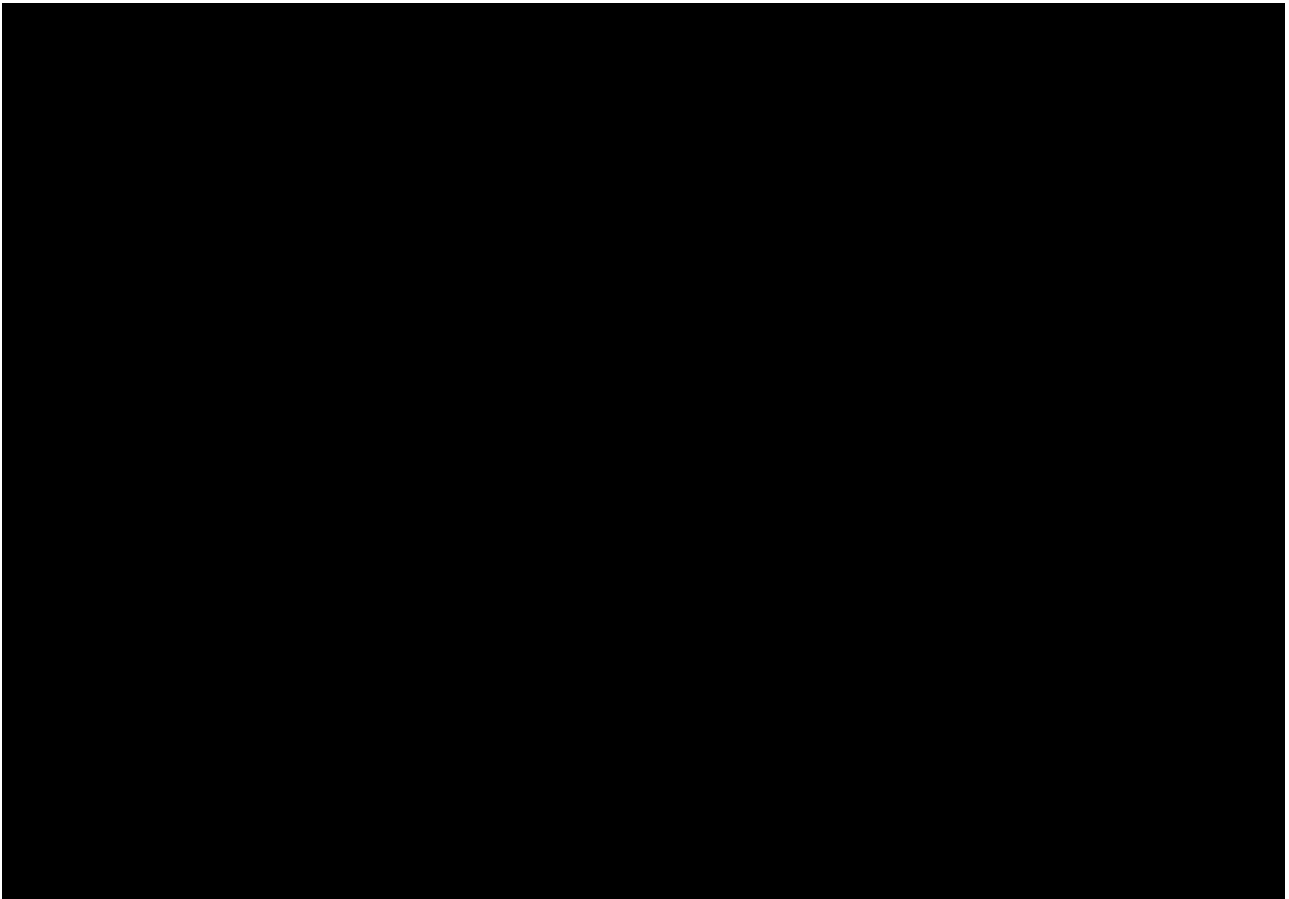


Figure 48. [REDACTED]
[REDACTED]

- (486) Due to data limitations, I am unable to compute reliable ad exchange market shares based on transactions restricted to ad exchange customer locations—i.e., based on transactions involving US open-web publishers or US advertisers.⁶⁹⁷ However, I am able to present market shares based on *user locations*—i.e., based on the location of the visitor to a publisher’s website. Such share calculations based on user locations can still be informative for at least two reasons.
- (487) First, publishers and advertisers in the US may particularly value ad tech products used to buy and sell display advertisements served to *users located in the US*. Consistent with this, a large fraction of open-web display transactions served by US publishers and purchased by US advertisers involve US users. [REDACTED]
[REDACTED]
[REDACTED]

⁶⁹⁷ Information on publisher and advertiser geographic locations are missing from data provided by many third-party ad exchanges, advertiser ad networks, and DSPs that produced data in this matter.

[REDACTED]

(488) Since advertisers and open-web publishers located in the US are thus likely to particularly value ad tech products that are able to effectively serve display ads to US users, an ad tech product's high market share over US users can inform the extent to which that product is attractive to US customers (i.e., US open-web publishers and US advertisers).

(489) Second, I am able to compare market shares based on user locations to those based on customer locations for a subset of exchanges whose data provide information on both publisher and user locations for indirect open-web transactions between 2020 – 2022. [REDACTED]
[REDACTED]. I find that impression and net revenue shares among this subset of exchanges are very similar across transactions involving US publishers *or* US users.⁷⁰⁰ Hence, even though market shares computed using transactions involving US users are not the same as those computed using transactions involving US publishers, this analysis suggests that they may be close.

(490) Having acknowledged these considerations, I calculate AdX's market share over transactions involving US users across a broader set of ad exchanges, and note that it is also high.⁷⁰¹ [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]³

(491)

[REDACTED]
[REDACTED]

698 [REDACTED]

699 [REDACTED]

700 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

701 To estimate the size of US-user impressions transacted by ad exchanges that did not produce data, I perform the following exercise: I first compute the the average ratio of impressions for US users relative to impressions for all users among ad exchanges who produced data with sufficient user-geography information. I then apply that average ratio to the estimate of total worldwide impressions for the exchanges who did not produce data at all or who did not produce data with US-user breakdowns. *See* Appendix H.

702 Figures depicting shares based on impressions from US users are contained in Appendix D.1.b.

703 [REDACTED]
[REDACTED]
[REDACTED]

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[REDACTED]

(492) Note that Verizon (Yahoo) shut down its exchange product to open-web publisher inventory in 2023.⁷⁰⁵ Excluding Verizon’s impressions from the ad exchange market size would provide AdX a 58% share of worldwide impressions and a 48% share of impressions from US users in 2022.⁷⁰⁶

(493) **Net Revenues (Fees).** [REDACTED]

⁷⁰⁴ For robustness, I have analyzed AdX’s market shares across several alternative specifications and find that these results are consistent. *See* Figure 89 in Appendix D.1.

⁷⁰⁵ Sara Fischer, “Exclusive: Yahoo to lay off more than 20% of staff as it shrinks ad biz,” Axios, February 9, 2023, <https://www.axios.com/2023/02/09/yahoo-layoffs-2023-tech-media-companies>. *See also* YAH_GG_LIT_004590 (06/26/2023).

⁷⁰⁶ *See* Figure 88 and Figure 89 in Appendix D.1.a.

V.C.3.b. Google is able to significantly deviate from competitive behavior in the ad exchange market

(511) Evidence that Google has substantial and sustained market power in the ad exchange market includes its ability to meaningfully deviate from competitive behavior in that market.

(512) [REDACTED]

(513) Google limiting AdX's real-time bids into rival publisher ad servers is consistent with Google's ability to deviate from competitive behavior in the ad exchange market. I discuss this conduct further in Section VII.C.

(514) [REDACTED]

(515) [REDACTED]

⁷⁴² See Section VII.C on Google's exclusive provision of unrestricted access and use of real-time bids from AdX to DFP.

⁷⁴³ [REDACTED]

⁷⁴⁴ See [REDACTED]

⁷⁴⁵ [REDACTED]

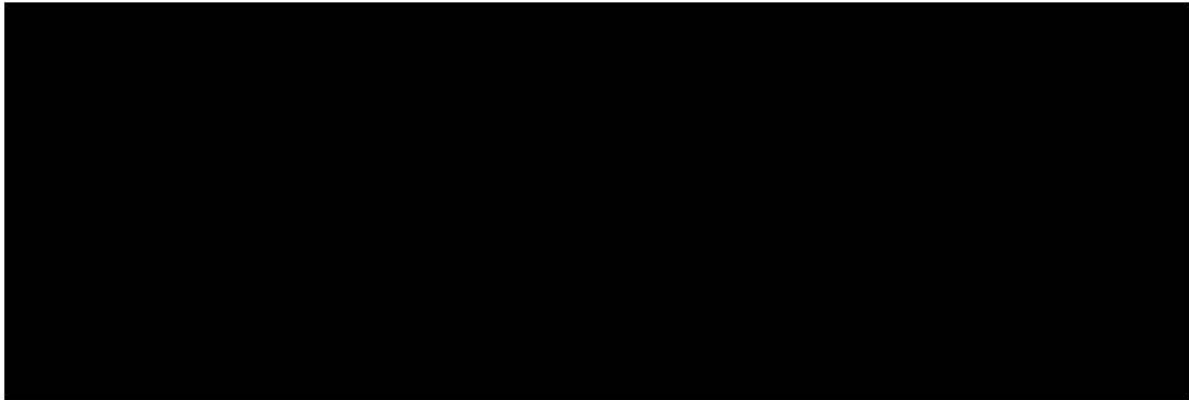
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(516) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(517) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]



- [REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]

- (520) For these reasons, I conclude that Google Ads has substantial market power in the advertiser ad network market, and has likely had such market power since at least 2015.

V.D.1. Sources of Google's market power in the advertiser ad network market

- (521) Google Ads' dominant position in the advertiser ad network market derives in part from its access to unique advertising demand and publisher inventory, and its much larger scale than other competitors and potential competitors.

- (522) **Unique advertising demand and publisher inventory.** Google Ads had a key advantage from its creation because of its exclusive access to valuable Google Search advertising inventory.⁷⁵⁶ [REDACTED]

[REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]

⁷⁵⁶ In addition, a deal with AOL enabled AdWords advertisers to purchase search ads on AOL search listings and thereby granted AdWords and its customers access to AOL's then-34 million users. Christine Frey, "Overture Loses AOL Contract to Google," Los Angeles Times, May 2, 2002, <https://www.latimes.com/archives/la-xpm-2002-may-02-fi-overture2-story.html>. The deal propelled Google's search advertising business and by early 2003, Google touted the "largest and fastest growing" online advertising base in the industry, with over 100,000 advertisers. Google, Google News, "Google Builds World's Largest Advertising and Search Monetization Program," Google, March 4, 2003, <https://googlepress.blogspot.com/2003/03/google-builds-worlds-largest.html>.

⁷⁵⁷ [REDACTED]
 [REDACTED]
 [REDACTED]

⁷⁵⁸ See Section IV.E.1.

[REDACTED]

- (523) Today, Google Ads customers gain access to additional Google O&O inventory including YouTube that cannot be accessed through non-Google bidding tools,⁷⁶⁰ as well as access to open-web publishers using AdSense. [REDACTED]

[REDACTED]

- (524) **Scale and data.** [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

V.D.2. Indirect evidence of Google's market power in the advertiser ad network market

- (525) Google's high market shares across a variety of measures, as well as evidence of significant barriers to entry, provide indirect evidence of Google's substantial and sustained market power in the advertiser ad network market.

⁷⁵⁹ See [REDACTED]

⁷⁶⁰ Advertisers can access YouTube and Google O&O inventory like Search via Google Ads. Google, "Grow your business with Google Ads," *Google Ads Help*, https://ads.google.com/intl/en_us/home/campaigns/video-ads/. See also Sections II.C.3 and V.A.1.

⁷⁶¹ See Figure 33 and Figure 38 in Section IV.E.1.a.

⁷⁶² See Figure 35 in Section IV.E.1.a. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

⁷⁶³ [REDACTED]

[REDACTED]

⁷⁶⁴ See Section III.D.

VII. Google has historically engaged in, and continues to engage in, conduct within and across the relevant markets that excluded and harmed the competitiveness of rivals and potential entrants

- (570) Over the last 15 years, Google has pursued a campaign to obtain, strengthen, and protect substantial market power throughout the open-web display ad tech stack. Although some of its market power may have been obtained through improvements to its existing products, Google has nonetheless engaged in other actions that have preserved its market power by acquiring or excluding rivals, and by frustrating and impeding their efforts to compete for customers.
- (571) In particular, Google has engaged in efforts to leverage its market power in one relevant market to strengthen its position in other markets. By using its position in one market to benefit its products in another, Google reduces demand (i.e., advertiser spending) or supply (i.e., publisher inventory) for rivals in the targeted market, both reducing the competitiveness of these rivals and the likelihood of entry of new ones. Moreover, because of indirect network effects and the need for different ad tech products to interoperate, reducing rivals' competitiveness in the targeted market also reduces the attractiveness of non-Google alternatives in other ad tech product markets.
- (572) In this Section, I examine the competitive effects of five actions that Google has undertaken with its ad tech products. I provide the basis for my opinion that these actions have harmed the competitiveness of rivals and their ability to attract advertiser spending and publisher inventory within the publisher ad server, ad exchange, and advertiser ad network markets. (Later, in Section VIII, I discuss how these actions have preserved and enhanced Google's market power and harmed customers and consumers.)
- (573) Before I examine the competitive effects of Google's five actions, I first provide background context for Google's conduct in Section VII.A.
- I provide an overview of Google's strategy in the ad tech stack since its acquisition of DoubleClick in 2008. This acquisition, which provided Google with its publisher ad sever (DFP) and ad exchange (AdX) products, laid the groundwork for Google's practice of using market power in one relevant market to foreclose rivals and distort competition in favor of its own products in another market. I describe as well the importance that Google placed on controlling the publisher ad server, allowing it to then further protect and enhance its market power across the ad tech stack.
 - I also describe how Google viewed yield managers and header bidding tools—which helped publishers access rival non-Google ad exchanges—as “disintermediation” threats to DFP's substantial market power. This discussion, as well as Google's varied responses, shows that

Google's efforts to impede and harm the competitiveness of rival ad exchanges not only had effects on competition within the ad exchange market, but also impacted competition within the advertiser ad network and publisher ad server markets and protected DFP's substantial market power. Moreover, the limited impact of these threats to Google highlights the durability of Google's entrenched position and market power, maintained and enhanced by the conduct described in the remainder of the Section.

(574) Next, I evaluate five actions taken by Google. In Sections VII.B and VII.C, I describe how following the acquisition of DoubleClick, Google established a Google-only pipeline through the heart of the ad tech stack, denying non-Google rivals the same access to real-time demand that it provided its own products, by providing:

- (1) Unrestricted access to Google Ads' advertiser demand exclusively to AdX;
- (2) Access to and use of real-time bids from AdX exclusively to DFP.

(575) In these instances, Google's actions denied or otherwise degraded rivals' access to a valuable asset that it controlled, and conditioned access to this asset on the use of its other products.⁸¹⁵ The bidding relationship between Google Ads and AdX foreclosed publishers who used a rival exchange from Google Ads' advertiser demand; this had the effect of diverting publisher inventory away from rival exchanges and towards AdX. Similarly, foreclosing rival publisher ad servers from access to real-time bids from AdX (whose own market power was enhanced by its preferred access to Google Ads) steered publishers towards DFP instead.

(576) Hence, Google used the market power it had in the advertiser ad network market with Google Ads to enhance AdX's market power in the ad exchange market, which in turn Google used to further strengthen and preserve DFP's market power in the publisher ad server market. Given Google Ads' and AdX's market power, Google possessed both the ability and evident incentive to engage in these actions. Such actions harmed the competitiveness of rivals in the relevant markets, ultimately to the detriment of advertisers and publishers.

(577) In Section VII.D, I describe how Google used DFP's market power, strengthened and preserved by the above conduct, to further advantage AdX over rival exchanges. It did so in at least two ways.

- (3) DFP granted AdX exclusive access among ad exchanges to its Dynamic Allocation and Enhanced Dynamic Allocation features (until the introduction of Exchange Bidding), thereby providing AdX with advantageous access to inventory over rival exchanges. AdX was thus

⁸¹⁵ In Sections VII.B.3 and VII.C.3, I discuss Google's AWBid feature, which allowed Google Ads to bid on rival exchanges for a subset of display impressions (albeit at a significantly higher targeted margin than it targeted on AdX), and Google's AdX Direct tag, which provided limited access to AdX to rival publisher ad servers. In both cases, I show that these features have meaningful restrictions, and that usage of these features is relatively small as a fraction of overall Ads or AdX transaction volume.

VII.A. Google's ad tech strategy and importance of DFP

- (583) This Section provides background and context for the evaluation of Google's exclusionary conduct examined in this report.

VII.A.1. Google's ad tech strategy and the importance of the publisher ad server

- (584) [REDACTED]
- (585) To help realize this objective and build up its open-web display advertising presence, Google purchased DoubleClick and its publisher ad server DFP in 2008,⁸¹⁷ formally introducing DoubleClick Ad Exchange (AdX) in 2009,⁸¹⁸ and later acquiring the DSP Invite Media in 2010⁸¹⁹ and yield manager AdMeld in 2011.⁸²⁰ With these pieces in place, Google restricted access to Google Ads' advertiser demand outside of its own "sell-side" products (AdX, AdSense, and DFP), and established an exclusive relationship between AdX and DFP. Both of these actions persist in some form today, and are described further below in Sections VII.B and VII.C.
- (586) By restricting access to demand from its valuable Google Ads product, Google was able to first attract and then lock in publishers to using its sell-side products, thereby providing it with the valuable display inventory with which to then attract additional advertising spend. Moreover, for reasons described in Section V.B, DFP's market power, once established, was protected due to significant

⁸¹⁶ [REDACTED]

⁸¹⁷ Eric Schmidt (then-Google Chairman and CEO), "We've officially acquired DoubleClick," *Google* (blog), Mar. 11, 2008, <https://googleblog.blogspot.com/2008/03/weve-officially-acquired-doubleclick.html>.

⁸¹⁸ Google News Announcement, "Google opens new DoubleClick Ad Exchange," News from Google, September 18, 2009, http://googlepress.blogspot.com/2009/09/google-opens-new-doubleclick-ad_18.html

⁸¹⁹ Neal Mohan (then Google Vice President of Product Management), "Investing in Exchange Bidding," *DoubleClick Advertising Blog*, Jun. 3, 2010, <https://doubleclick-advertisers.googleblog.com/2010/06/investing-in-exchange-bidding.html>.

⁸²⁰ Neal Mohan (then Google Vice President of Display Advertising), "Helping publishers get the most from display advertising with Admeld," *Google* (blog), Jun. 13, 2011, <https://googleblog.blogspot.com/2011/06/helping-publishers-get-most-from.html>.

switching costs publishers face in this market and publishers' tendency to use only a single publisher ad server for display advertising.

VII.A.1.a. The importance of the publisher ad server

(587) [REDACTED]

(588) [REDACTED]

(589) Google documents have described this strategy to “own the tag” with DFP, which would then benefit its other products (AdX and Google Ads), as follows:

- [REDACTED] (I discuss this conduct further in Section VII.D.1.)
- [REDACTED]

[REDACTED]

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[REDACTED]

(590)

[REDACTED] As I noted in
Section V, [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

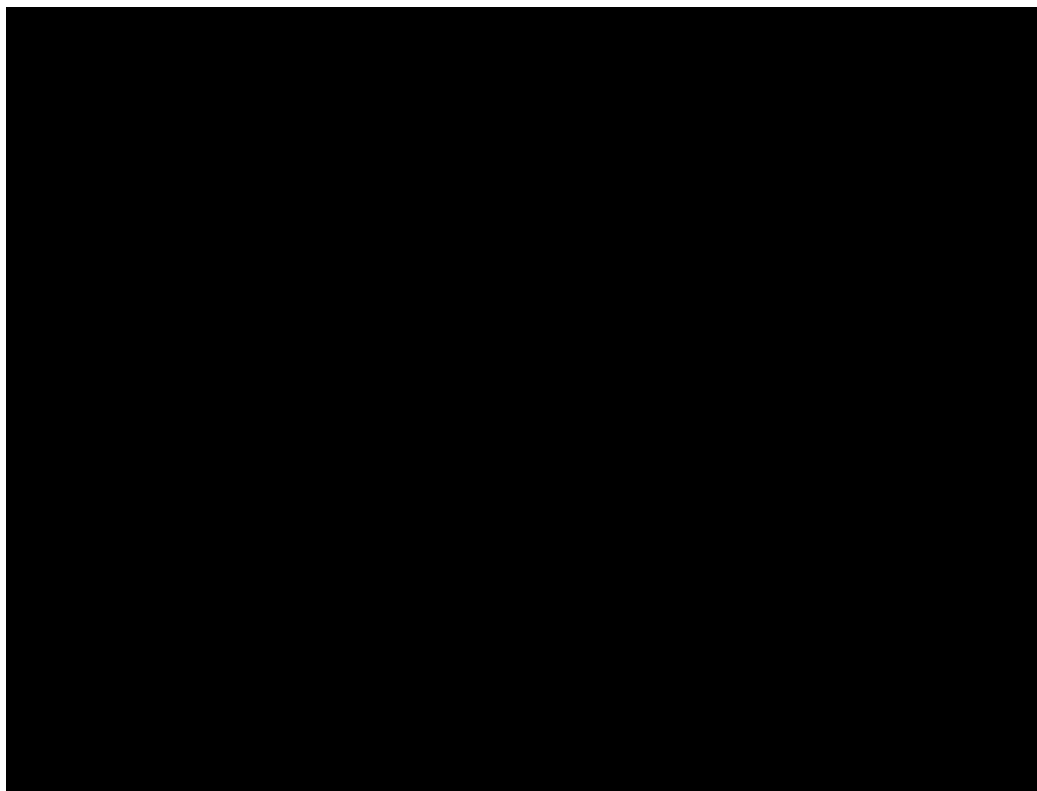
[REDACTED]

-
- [REDACTED]
 - [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
 - [REDACTED]
[REDACTED]
[REDACTED]
 - [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
 - [REDACTED]
[REDACTED]

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(595) Disintermediation, however, continued to be a concern. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Figure 63. [REDACTED]



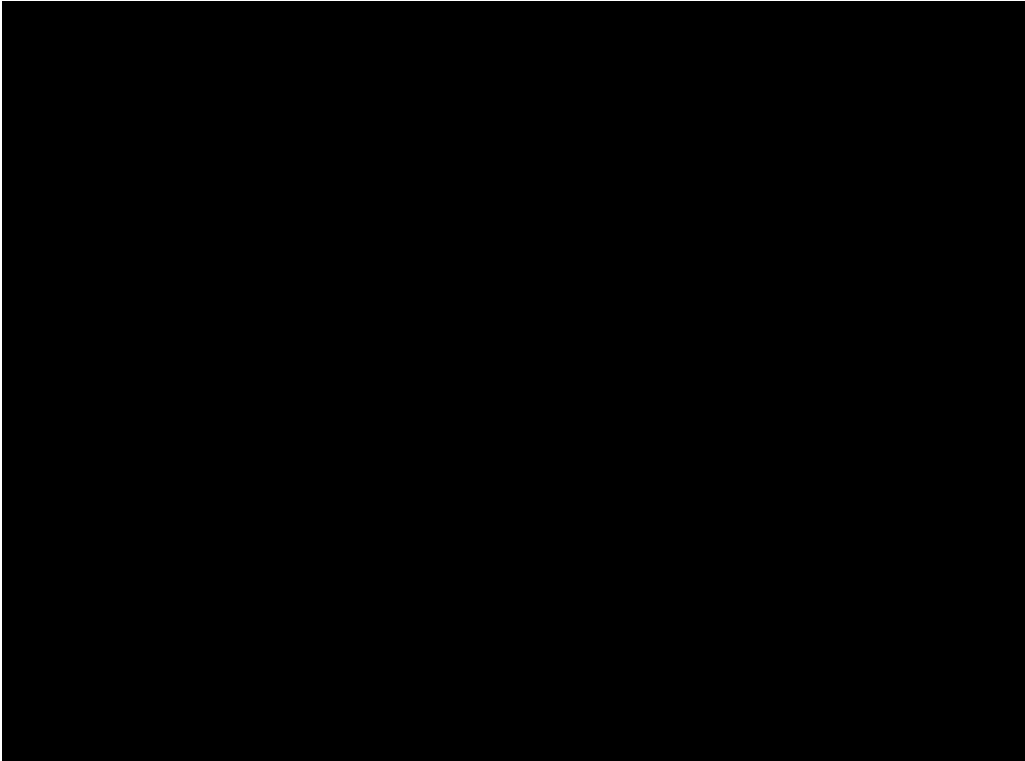
(596) The next slide in the presentation, shown in Figure 64, [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

-
- [REDACTED]
 - [REDACTED]
 - [REDACTED]

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[REDACTED]

Figure 64. [REDACTED]

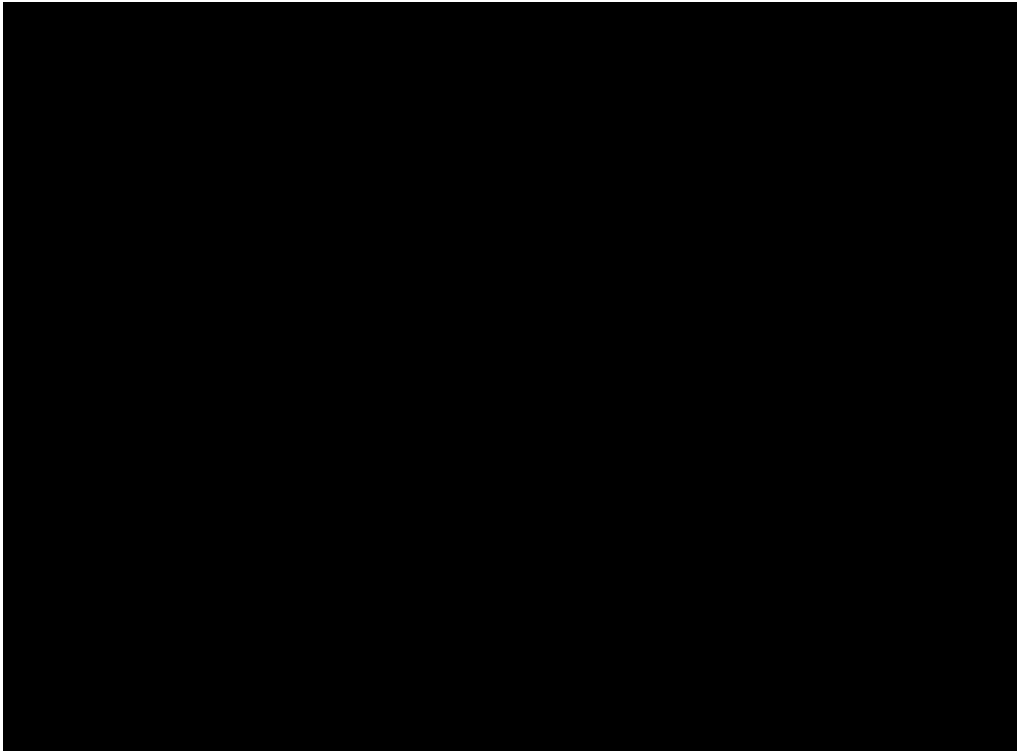


(597) The presentation then depicted [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] [REDACTED]
[REDACTED]

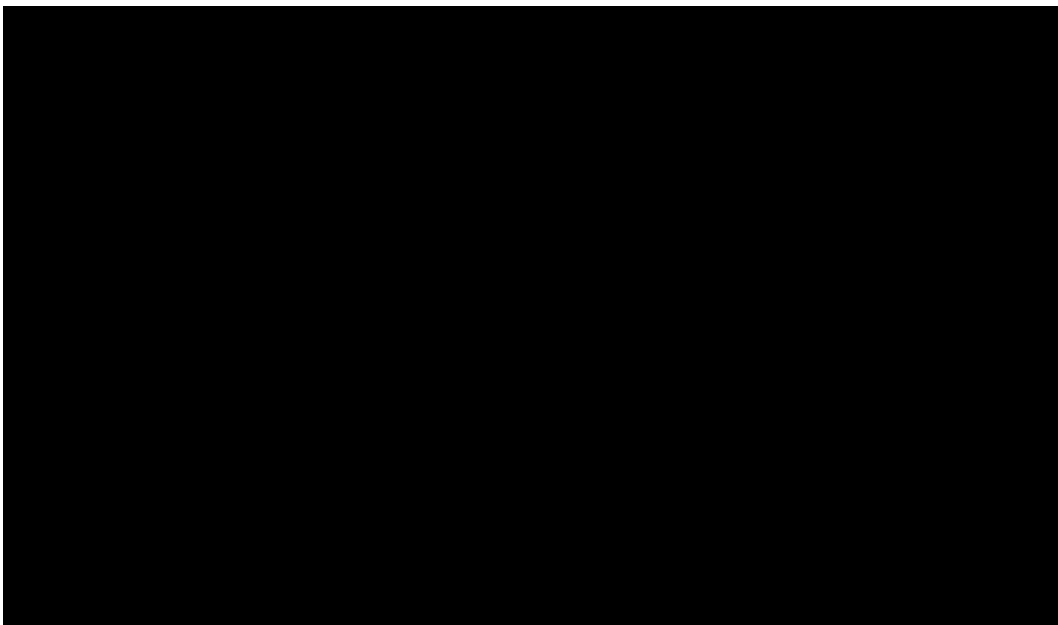
[REDACTED]
[REDACTED]

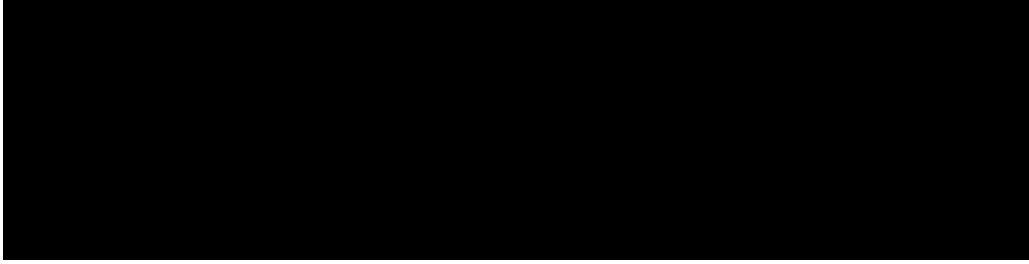
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Figure 65. [REDACTED]



(598) In many ways, [REDACTED]
[REDACTED]
[REDACTED] [REDACTED]
[REDACTED]





(599) Statements from internal documents [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(600) In Appendix L, I describe how:

- Publishers viewed header bidding as a way around Google’s restrictive policies regarding the use of its ad tech products, and benefited from header bidding allowing them to pit multiple demand sources in real-time competition against one another.
- Google [REDACTED] to its market power in the ad tech stack. I discuss how header bidding (in a manner similar to yield managers) could provide existing competitors or new entrants an ability to compete more effectively in the publisher ad server market by assisting publishers with accessing multiple real-time demand sources and exchanges.
- Google responded to header bidding in several ways, including launching Exchange Bidding and adjusting its bidding strategies for DV360 that had the effect of diverting advertiser spending away from third party exchanges and towards AdX. (In Section VII.D.2, I discuss another response—the restriction against setting variable price floors—that harmed the competitiveness of rival exchanges.)

(601) This discussion related to header bidding and Google’s responses supports two important points:

- First, despite the threat posed by header bidding, [REDACTED]
[REDACTED] This is in part due to Google’s extant market power across the entire ad tech stack (preserved and enhanced by Google’s conduct discussed later in this Section), which Google used in various ways to minimize the competitiveness of rival ad exchanges.

[REDACTED]
[REDACTED]
[REDACTED]

- [REDACTED]
[REDACTED] I return to this point, and the role that competition plays in encouraging innovation, in Section VIII below.

(602) Having provided this context, I turn in the rest of this Section to discussing the conduct that is the focus of my report.

VII.B. Google provided unrestricted access to Google Ads exclusively to AdX, thereby foreclosing rival exchanges from access to Google Ads' advertiser demand

(603) Following the DoubleClick acquisition, Google launched "AdX 2.0" (hereafter, AdX) on September 17, 2009.⁸⁴⁷ A 2009 Google document titled [REDACTED]

[REDACTED] (In this Section, as I have previously, I use Google Ads to refer to the advertiser ad network component of the product formerly known as AdWords.)

(604) Since the launch of AdX, Google has restricted the demand provided by Google Ads into rival exchanges, and continues to provide unrestricted access to all of Google Ads' advertiser demand ("Google Ads demand") for display advertising only to publishers using AdX and AdSense; [REDACTED] This exclusivity provides a competitive advantage to AdX and encourages publishers to use or prioritize AdX over rival exchanges.

⁸⁴⁶ [REDACTED]
[REDACTED]
[REDACTED] See discussion in Section II.E.4 and Appendix L.3.a.

⁸⁴⁷ Neal Mohan, "The DoubleClick Ad Exchange: growing the display advertising pie for everyone," Google Official Blog, September 17, 2009, <https://googleblog.blogspot.com/2009/09/doubleclick-ad-exchange-growing-display.html>; [REDACTED]

⁸⁴⁸ [REDACTED]
⁸⁴⁹ [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

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[REDACTED]

[REDACTED]

VII.B.3. Google's AWBid program did not prevent rival ad exchanges from being foreclosed from Google Ads' demand

(620) [REDACTED]
[REDACTED]
[REDACTED] In this Section, I show that this project, which did not fully launch until June 2015, was restricted to a subset of Google Ads' impressions, targeted higher margins on rival ad exchanges than on AdX, and ultimately has had limited impact on the share of Google Ads' spending on rival ad exchanges.

(621) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

867 [REDACTED]

868 [REDACTED]

869 [REDACTED]

870 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

(622) [REDACTED]
[REDACTED]
[REDACTED]

(623) [REDACTED], [REDACTED]
[REDACTED] [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(624) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

871 [REDACTED]
872 [REDACTED] See Sridhar Ramaswamy, “Ads and analytics innovations for a mobile-first world,” Google Ads & Commerce Blog, May 24, 2016, <https://blog.google/products/ads/ads-and-analytics-innovations-for-a-mobile-first-world/>. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
873 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
874 [REDACTED]
[REDACTED] See Google, “About topic targeting,” Google Ads Help, accessed December 16, 2023, <https://support.google.com/google-ads/answer/2497832?hl=en>. Google defines in-market targeting as going after customers that are “researching products or services and actively considering buying something like what [the advertiser] offer[s].” See Google, “In-market audience targeting,” Display & Video 360 Help, accessed December 16, 2023, <https://support.google.com/displayvideo/answer/6213232?hl=en>. Affinity targeting involves reaching customers “based on what they’re passionate about and their habits and interests.” See Google, “About audience segments,” Google Ads Help, accessed December 16, 2023, <https://support.google.com/google-ads/answer/2497941?hl=en>. Vertical targeting involves targeting ads based on “market verticals, and the content of webpages.” See Google, “Category targeting,” Display & Video 360 Help, accessed December 16, 2023, <https://support.google.com/displayvideo/answer/2697826?hl=en>; [REDACTED]
[REDACTED] See also Google, “About custom segments,” Google Ads Help, accessed December 16, 2023, <https://support.google.com/google-ads/answer/9805516?hl=en>. A Google document noted that following this expansion, over 57% of AWBId revenue would still come from remarketing, [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

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[REDACTED]

(625) As the AWBid program makes evident, Google Ads possessed the ability to bid into rival exchanges, thereby providing Google Ads' advertisers with greater access (and potentially at lower prices) to publisher inventory, and providing publishers using rival ad exchanges the benefits of competition from Google Ads' bidders.

(626) However, [REDACTED]

875 [REDACTED]

876 [REDACTED]

877 [REDACTED]

878 [REDACTED]

879 [REDACTED]

(627) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(628) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(629) I have examined Google Ads' purchasing behavior using data that have been produced in this matter. Since 2014, Google Ads impressions won through non-Google products (i.e., not AdX or AdSense) have not represented a meaningful proportion of Google Ads demand. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] In 2022, [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

880 [REDACTED]

881 [REDACTED]

882 [REDACTED]

883 [REDACTED]

884 [REDACTED]

885 [REDACTED]

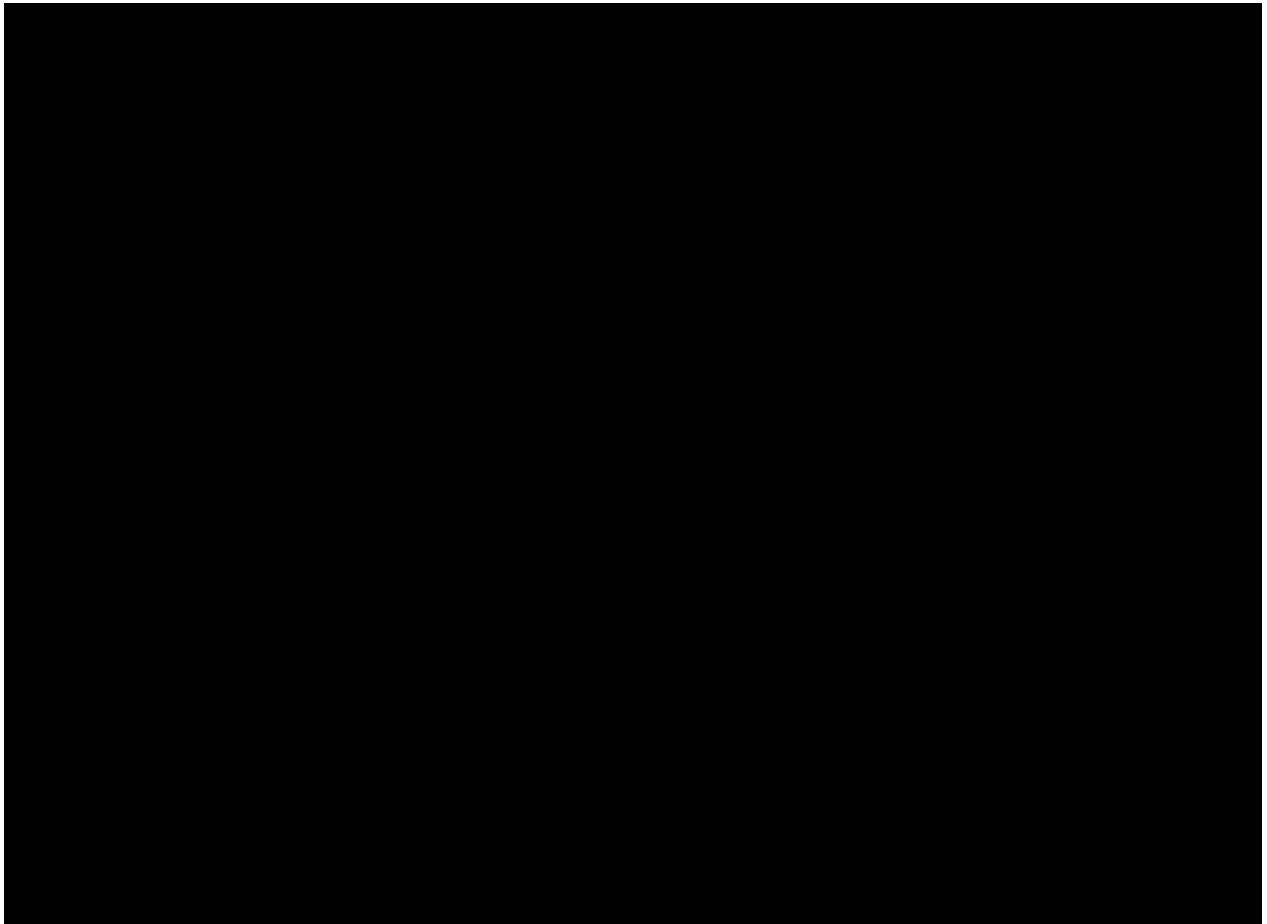
[REDACTED]

[REDACTED]

886 I conservatively excluded Google owned-and-operated (O&O) properties from these calculations. Including Google O&O properties would increase the denominator and therefore decrease the "non-Google inventory" percentage of Google Ads open-web display impressions. Advertisements placed through Google Ads can appear on Google Finance, Gmail, Blogger and YouTube. *See* Google, "Where your ads can appear", accessed December 17, 2023, <https://support.google.com/google-ads/answer/1704373?hl=en>.

887 [REDACTED]

Figure 66. [REDACTED]



- (630) Using Google’s log-level data from June 2023, I calculate that AdX’s share of Google Ads worldwide indirect open-web display impressions on ad exchanges is [REDACTED] and third-party exchanges’ share is [REDACTED].⁸⁸⁸ These data also allow me to examine how competitive Google Ads is when bidding across different exchanges. For this set of impressions, [REDACTED]
[REDACTED]
[REDACTED] This wide difference in “win rates” when Google Ads bids into AdX versus when it bids into a rival ad exchange is consistent with Google Ads’ bids into rival exchanges being less competitive than those it submits

⁸⁸⁸ Google Ads-AdX log-level data; Google Ads-Third Party Exchange log-level data (see Appendix H.1). I exclude AdSense from the calculation to highlight the share of Google Ads demand that goes to AdX versus non-Google rival ad exchanges; including AdSense would increase the share of Google Ads demand that goes to Google products (AdX or AdSense).

⁸⁸⁹ [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

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harmed their competitiveness by exclusively providing access to AdX's real-time bids to DFP (see Section VII.F).

VII.C.3.a. AdX Direct has meaningful limitations and limited usage

(644) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(645) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

VII.C.3.a.i. AdX Direct does not return real-time AdX bids to publishers using third-party publisher ad servers

(646) AdX does not integrate with rival ad servers in the same manner as it does with DFP. In particular, internal Google documents discuss an important reason why an AdX Direct tag does not provide publishers using rival publisher ad servers with the same features they would have on DFP: AdX

916 [REDACTED]
[REDACTED] Neal Mohan, "The DoubleClick Ad Exchange: Growing the Display Advertising Pie for Everyone," last modified September 17, 2009, <https://googleblog.blogspot.com/2009/09/doubleclick-ad-exchange-growing-display.html>; [REDACTED]
[REDACTED]
[REDACTED]

917 [REDACTED]
[REDACTED]
[REDACTED]

918 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

919 [REDACTED]
920 [REDACTED]
921 [REDACTED]
922 [REDACTED]

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[REDACTED]

[REDACTED]

(647) [REDACTED]

(648) These descriptions are also consistent with testimony from a rival publisher ad server provider. [REDACTED]

923 [REDACTED]

924 [REDACTED]

926 [REDACTED]

927 [REDACTED]

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[REDACTED]

(649)

[REDACTED]

VII.C.3.a.ii. AdX Direct's usage by third-party publisher ad servers is limited.

(650)

[REDACTED]

(651)

First, [REDACTED]

[REDACTED]

928

929

930

931

932

VII.D. Google used DFP's substantial market power to deny rival exchanges advantages provided to AdX and interfere with publishers' ability to work with rivals

(657) In this Section, I discuss how Google used DFP's substantial market power to deny rival exchanges advantages provided to AdX and inhibit publishers' ability to work with rivals:

- In Section VII.D.1, I discuss how Google, until the introduction of Exchange Bidding, provided only AdX with the ability to participate in Dynamic and Enhanced Dynamic Allocation within DFP. Google exclusively provided AdX with this advantage—and the associated benefits of “first look” and “last look”—and left rival exchanges with fewer and less valuable impressions to bid upon within DFP.
- In Section VII.D.2, I discuss how Google introduced variable floor restrictions within DFP, which eliminated the ability of publishers to set lower reserve prices (i.e., price floors) for third-party exchanges than for AdX, thereby impeding publishers' ability to steer more of their impressions to AdX's rivals.

(658) Later, in Sections VII.F.1.b and VII.F.1.c, I discuss how these actions harmed the competitiveness of rival exchanges.

(659) These actions also increased the effectiveness of exclusive access to and use of real-time bids from AdX to DFP (discussed in Section VII.C above) because rival publisher ad servers had worsened non-AdX ad exchanges to work with. Hence, the actions taken by DFP to weaken rival exchanges described here, and the exclusive access to AdX's real-time bids provided to DFP described earlier, served to reinforce one another.

VII.D.1. Google exclusively provided AdX with Dynamic and Enhanced Dynamic Allocation, denying “first look” and “last look” advantages to rival exchanges

(660) In Section II.E.2 I described Dynamic Allocation (DA), a feature Google provided within DFP since the launch of AdX. DA allowed publishers to use real-time bids from AdX to compete with directly booked, non-guaranteed ads within DFP. In Section II.E.2 I also discussed Enhanced Dynamic

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Allocation (EDA), which Google launched in 2015 and allowed real-time bids from AdX to compete also against guaranteed ads.

(661) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(662) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

944 [REDACTED]
945 [REDACTED]
[REDACTED]
946 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

947 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

948 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
to beat this floor. The floor price was shared with all AdX buyers: meaning all Google and non-Google AdX buyers.”)

949 [REDACTED]
[REDACTED] Google, “Line
item types and priorities,” Google Ad Manager Help, <https://support.google.com/admanager/answer/177279?hl=en>.

(663) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(664) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(665) The rest of this Section is organized as follows.

- In Section VII.D.1.a, I describe the Dynamic and Enhanced Dynamic Allocation programs, and how DFP's exclusive provision of them to AdX provided AdX with first- and last-look advantages over rival exchanges;
- In Section VII.D.1.b, I describe how AdX was able to further benefit from these advantages with a program known as "AdX Dynamic Revenue Share";

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

950 [REDACTED]

951 [REDACTED]
[REDACTED]
[REDACTED]

952 [REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

954 [REDACTED]
[REDACTED]
[REDACTED] As I
discussed in Section II.E.3, [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

- In Section VII.D.1.c, I explain that AdX meaningfully benefitted, and rivals were meaningfully adversely impacted, from these exclusive advantages provided by DFP.

VII.D.1.a. Dynamic and Enhanced Dynamic Allocation provided AdX with “first look” and “last look” advantages over rival exchanges

(666) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(667) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(668) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] This reduced publisher revenues and the efficiency of the auction relative to having these demand sources compete in real time with each other.

(669) [REDACTED]
[REDACTED]
[REDACTED]

955 [REDACTED]
[REDACTED]
[REDACTED]
DoubleClick Publisher Blog, “Delivering yield, speed, and control with DoubleClick for Publishers First Look,” December 1, 2015, DoubleClick Publisher Blog, <https://doubleclick-publishers.googleblog.com/2015/12/delivering-yield-speed-and-control-with.html>

956 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

957 [REDACTED]

958 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

(670)

[REDACTED]

[REDACTED]

(671) By preventing other exchanges from being called upon in Dynamic Allocation, Google subjected its *rivals* to precisely the dynamic Dauwalter described. Because AdX could purchase queries before remnant line items could provide a bid, AdX could “cherry pick” higher value queries (i.e., those queries that advertisers were willing to bid more for) before its rivals. In turn, this would reduce the CPMs that rivals—whenever called—would be able to deliver, reducing their historical performance. If this occurred, as the statement indicates, publishers would likely react by “decreasing inventory access” to these rivals by ranking rival exchanges lower in the waterfall (e.g., if rankings are based on historical outcomes) or no longer calling them, leading to even lower CPMs for those rival exchanges.

(672) This “self-fulfilling prophecy” whereby “less-valuable inventory begets lower CPMs... which begets even lower CPMs” is related to an economic feature of selection markets:⁹⁶¹ [REDACTED]

[REDACTED]

⁹⁵⁹ [REDACTED]

⁹⁶⁰ [REDACTED]

⁹⁶¹ In selection markets where transactions differ in value, firms have an incentive to engage in “cherry-picking” or “cream-skimming” more valuable transactions, leaving behind the less valuable ones. See Liran Einav, Amy Finkelstein, and Neale Mahoney, “The IO of Selection Markets,” *Handbook of Industrial Organization, Volume 5*, eds. Kate Ho, Ali Hortaçsu, and Alessandro Lizzeri (2021), 390–426. With AdX’s first-look advantage, impressions that AdX did not purchase and other ad exchanges could then bid on were likely to be lower value than those impressions that AdX did purchase.

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[REDACTED]

- (673) When header bidding emerged, AdX’s exclusive access to Dynamic Allocation became referred to as a “last look” advantage against header-bidding exchanges. The reason is that, previously, other remnant line items in DFP reflected historical or static prices. [REDACTED]

[REDACTED]

- (674) [REDACTED]

962 [REDACTED]

963 See Figure 151 in Appendix L.2.a [REDACTED]

964 [REDACTED]

965 [REDACTED]

(682) Note that this exercise likely understates the impact of removing the [REDACTED]
[REDACTED]
[REDACTED]¹ Such adjustments would likely lead to a much larger shift in transactions won by non-AdX exchanges.

VII.D.1.b. Google's AdX Dynamic Revenue Share program enhanced Google's Last Look advantage

(683) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

(684) [REDACTED]⁴ As an example, if the top bid into AdX was \$1 and the publisher's floor was less than \$0.8, AdX would be able to deduct a revenue share of 20% from the \$1 bid and still provide the publisher with a bid that clears the floor. If however the publisher's floor—potentially reflective of the highest header bidding bid—was \$0.9, AdX under a fixed-revenue share of 20% would not be able to win the auction. However, under AdX DRS, AdX could adjust the revenue share in this auction—here, to 10%—and still win the auction by paying out \$0.90 to the publisher and collecting \$1 from the winning bidder.

(685) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

981 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
982 [REDACTED]
983 [REDACTED]
[REDACTED]
984 [REDACTED]
985 [REDACTED]
986 [REDACTED]
987 [REDACTED]
988 [REDACTED]
[REDACTED]
989 [REDACTED]
[REDACTED]

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[REDACTED]

(686)

[REDACTED]

(687)

[REDACTED]

(688)

[REDACTED]

990

[REDACTED]

991

[REDACTED]

992

[REDACTED]

993

[REDACTED]

VII.D.2. Google prevented publishers from setting variable pricing floors, weakening competitive pressures on AdX and impeding publisher's ability to sell impressions through rival exchanges

- (694) Google's Unified Pricing Rules ("UPR"), launched with Google's introduction of the Unified First Price Auction ("UFPA") in 2019, included a restriction that publisher pricing rules "will be applied to all partners equally, and cannot be set for individual buying platforms."⁹⁹⁹ [REDACTED]

- (695) First, as I describe, publishers valued the ability to adjust price floors and often set lower floors for rival exchanges than for AdX. This implies that publishers were willing to serve impressions through non-Google ad exchanges even if, for a given impression, AdX would pay more for that impression. This is consistent with publishers deriving non-monetary or quality/service benefits from selling impressions through rival exchanges. Moreover, if rival exchanges obtained more transaction volume, they would likely have improved both in adoption, usage, and hence monetization over time, thereby yielding additional benefits to publishers through increased competition among exchanges.

- (696) Second, publishers' higher floors on AdX imposed more competition on the bids received from AdX. Additionally, because AdX (prior to the change to UFPA) dynamically adjusted its take rates under DRS, higher floors also would tend to put pressure on the fees that AdX could charge.

- (697) Google's variable floor restriction eliminated this ability of publishers to work with rival exchanges via setting variable floors, increasing Google's AdX revenues and impressions, and reducing those of rivals. Similar to how most-favored nation or anti-steering clauses can yield anticompetitive effects in other platform settings,¹⁰⁰⁰ Google's variable floor restriction softened the competitive pressures on AdX to reduce fees, improve quality, or otherwise increase its attractiveness to publishers that floored its exchange higher in order win business that was being captured by rival exchanges.

- (698) Google thus used its dominant position in the publisher ad server market to impede competition in the exchange market, and capture business for AdX not through product innovation or fee reductions, but rather by frustrating the efforts of publishers and rival exchanges to transact with one another.

- (699) [REDACTED]

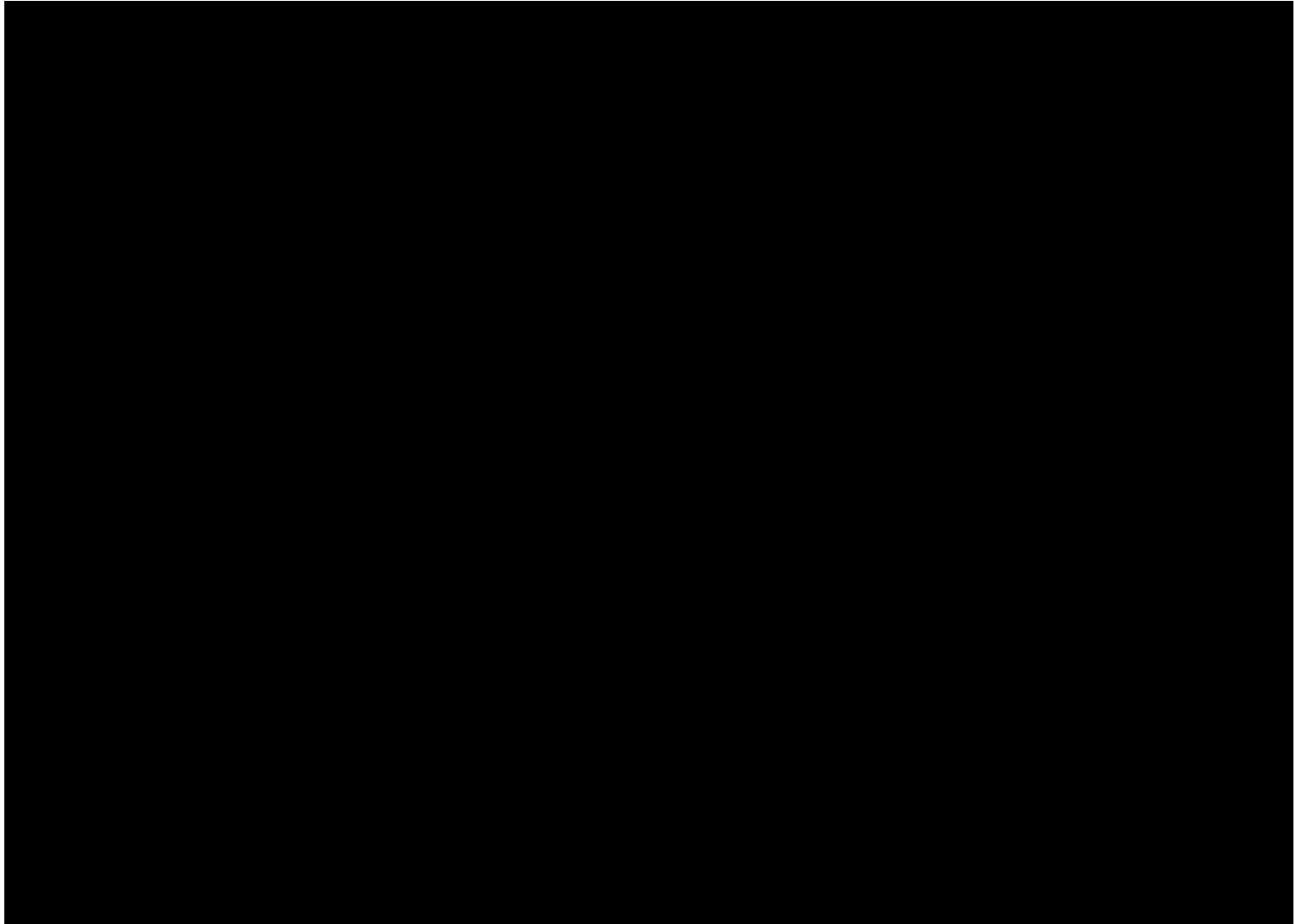
⁹⁹⁹ Jason Bigler, "An update on first price auctions for Google Ad Manager," Google Ad Manager Blog, May 10, 2019, <https://www.blog.google/products/admanager/update-first-price-auctions-google-ad-manager/>.

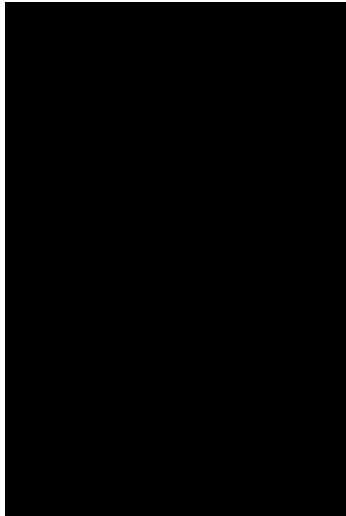
¹⁰⁰⁰ See Section VI.

¹⁰⁰¹ [REDACTED]

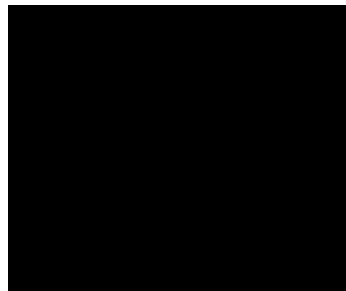
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E.3. Google Ads margins





- (6) I also received data from the following third-party exchanges, but I do not include them in my analyses because they offer products that are either in-app or video only, and thus are not included in the product markets I've defined.



H.2. Additional limitations

- (7) Where possible, I exclude transactions that are sold through a publisher's owned and operated ad tech products from Google and third-party datasets before incorporating them into analyses.¹³⁰⁹

¹³⁰⁹

[REDACTED]

¹³⁰⁹ Publishers who sell their ad inventory through their owned and operated ad tech products include Google, Verizon (including Yahoo and AOL), Xandr (Microsoft), FAN, and Amazon. I exclude all transactions involving these publishers selling inventory through their owned and operated ad tech products from the ad exchange and bidding tools markets.

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- (8) Where possible, I limit Google and third-party datasets to indirect, open-web, display transactions before incorporating them into analyses.¹³¹⁰

- [REDACTED]
- [REDACTED]
- [REDACTED]
- “Open-web” excludes in-app transactions.
- “Display” includes transactions with display and outstream video ad types.
- I include transactions through desktops and mobile devices. I exclude transactions through other devices, such as connected TV.

H.3. Market size calculations

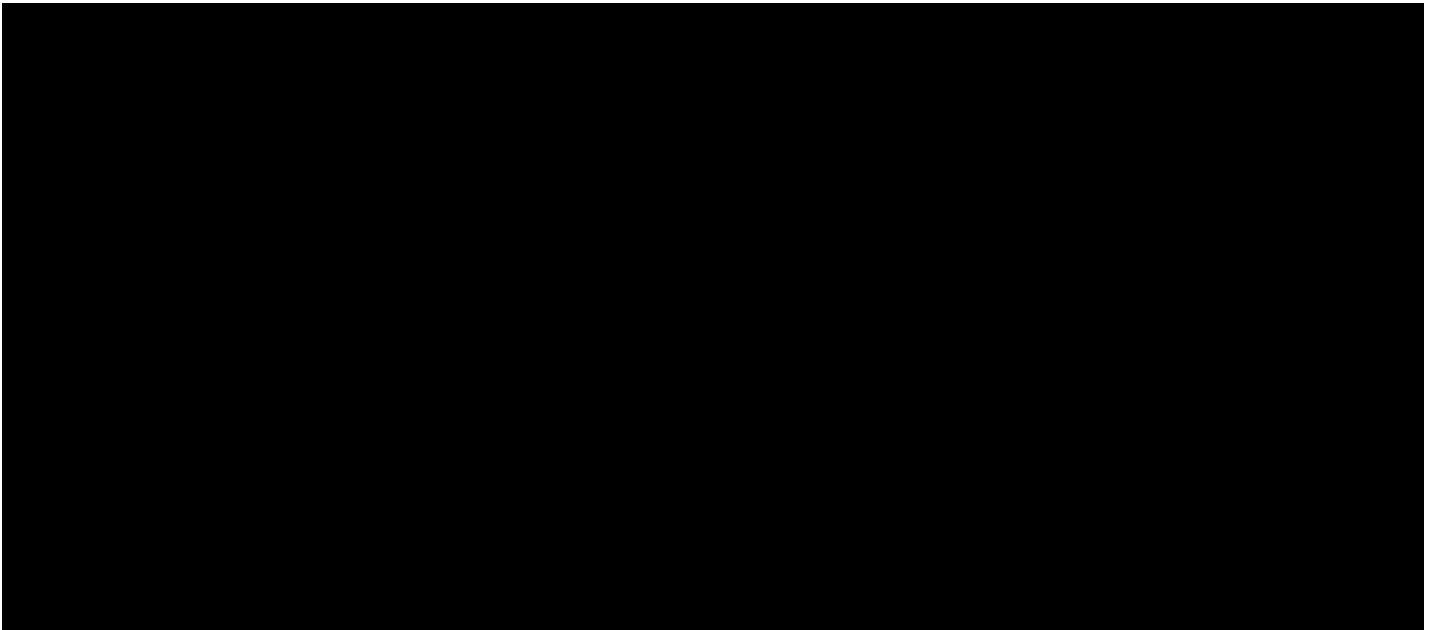
H.3.a. Setup

- (9) To explain the calculation of market sizes used for computing market shares, I define three groups of exchanges (where the identity of products in each group differ by month, depending on data availability):
1. Exchanges that produced data that identify the bidding tool source (E1)
 2. Exchanges that produced data that do not identify the bidding tool source (E2)
 3. Exchanges that did not produce data (all other exchanges, E3)
- (10) Likewise, there are three groups of bidding tools:
4. Bidding tools that produced data that identify the ad exchange (B1)
 5. Bidding tools that produced data that do not identify the ad exchange (B2)
 6. Bidding tools that did not produce data (all other bidding tools, B3)
- (11) Note that some third-party exchanges and bidding tools produced only impressions or revenue data, so these categories are defined separately for impressions and net revenue calculations. [REDACTED]
- [REDACTED]

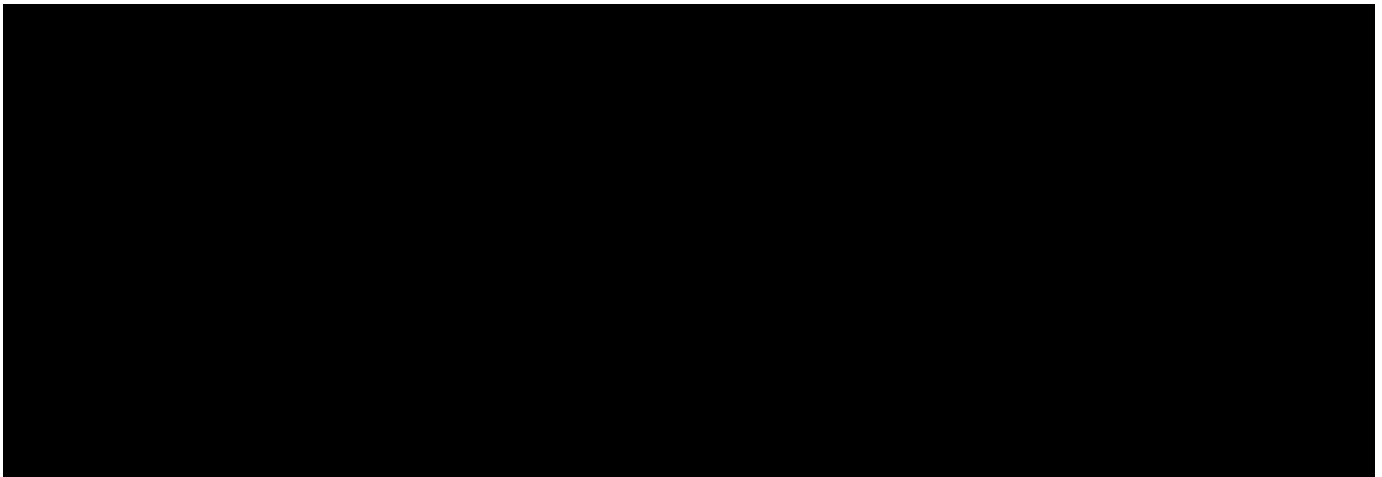
¹³¹⁰ When transaction type, channel, ad type, or device variables are missing or unknown, I assume they are in-market and include them in my analyses unless otherwise noted.

¹³¹¹ [REDACTED]

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L.3.b. Adjustments to DV360's bidding strategies



[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

1429 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

-
- [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]

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[REDACTED]

[REDACTED]

-
- [REDACTED]
 - [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
 - [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
 - [REDACTED]
[REDACTED]
[REDACTED]
 - [REDACTED]
[REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]

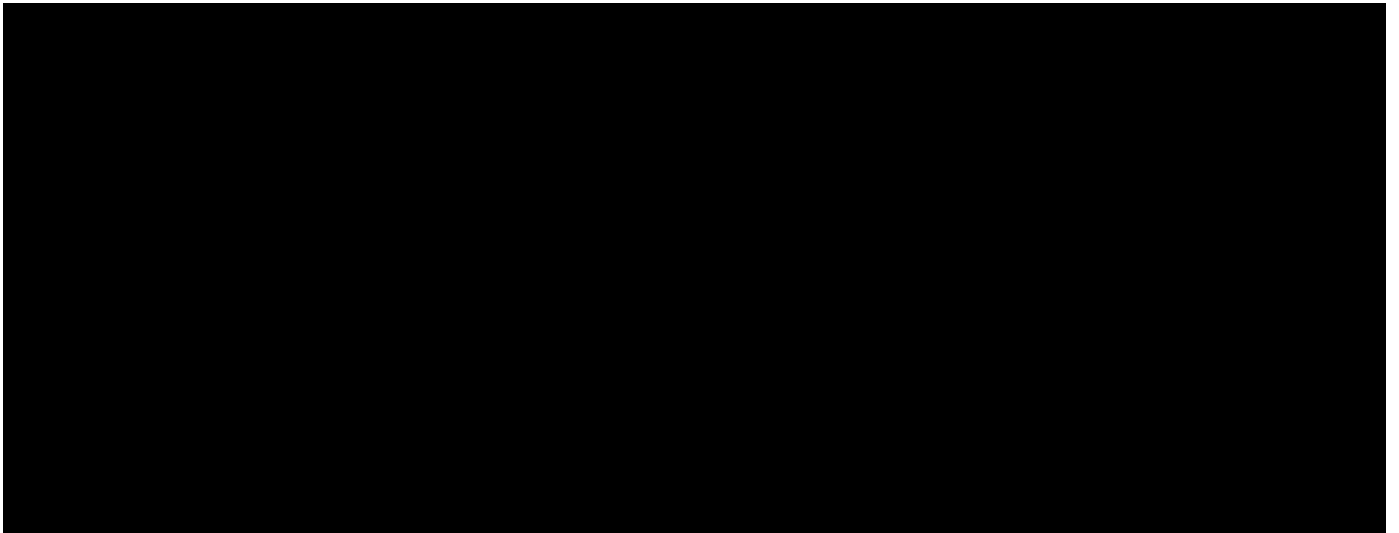
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[REDACTED]

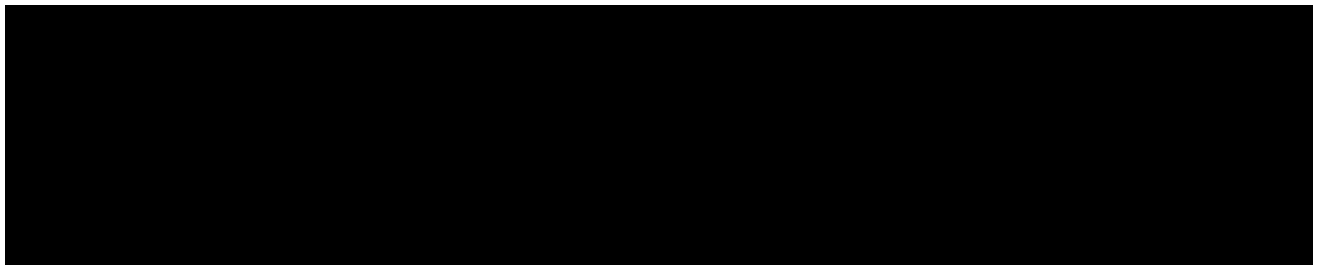
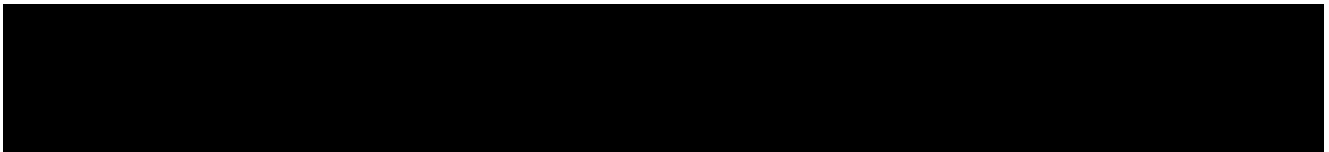
[REDACTED]

(70) Google Ads Dynamic Revenue Share (“Google Ads DRS”) and Project Bernanke were programs that allowed Google to dynamically adjust the margin that Google Ads targeted on impressions won through AdX in order to win more impressions and increase its profits.

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L.4.b. Global Bernanke and Project Bell



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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

1483

[REDACTED]

Appendix M. Glossary

Term/abbreviation	Definition
Authorized Buyers	Authorized Buyers are bidding tools authorized to purchase inventory and participate in real-time bidding on AdX. ¹⁴⁸⁴
Ad exchanges	Software products that run real-time auctions for publishers' display ad inventory among advertisers. ¹⁴⁸⁵
[REDACTED]	[REDACTED] [REDACTED] [REDACTED] [REDACTED] ¹⁴⁸⁶
Advertiser ad networks	Software products that advertisers use to purchase display ad inventory from publishers. ¹⁴⁸⁷
AdSense	AdSense is the web publisher-facing component of Google's display ad network. ¹⁴⁸⁸
AdSense for Content ("AFC")	A Google product that provides "a self-service platform for Web publishers that do not have direct sales to monetize their content. AFC focuses on automation and offers limited controls to publishers." ¹⁴⁸⁹
AdSense for Search ("AFS")	A Google product that allows publishers to monetize search results by serving ads within the publisher's own search features. ¹⁴⁹⁰
[REDACTED]	[REDACTED] [REDACTED] [REDACTED] a campaigns to show digital ads on Google-owned inventory and third-party partner websites. ¹⁴⁹¹
AdX	Google's ad exchange.
AdX Direct	A limited way for third-party publisher ad servers to obtain access to AdX demand. ¹⁴⁹²
APAC	Asia-Pacific
AWBid	A Google program that allowed AdWords buyers to access retargeting impressions from non-Google publishers and exchanges such as AdMeld, PubMatic, and Rubicon. ¹⁴⁹³
Alchemist (Bernanke for first-price auctions)	2019 adaption to the Google Ads bidding algorithm to no longer submit two bids when targeting an average take rate, accounting for AdX's transition from second-price to first-price auctions. ¹⁴⁹⁴
[REDACTED]	[REDACTED] [REDACTED] [REDACTED]

¹⁴⁸⁴ Google, "Authorized Buyers overview," Authorized Buyers Help, <https://support.google.com/authorizedbuyers/answer/6138000?hl=en>.

¹⁴⁸⁵ Section II.B.3. (Ad exchanges).

¹⁴⁸⁶ [REDACTED]

¹⁴⁸⁷ Section II.B.2.b. (Advertiser ad networks).

¹⁴⁸⁸ Section II.C.3.b. (AdSense).

¹⁴⁸⁹ Section II.C.3.b. (AdSense).

¹⁴⁹⁰ Section II.C.3.b. (AdSense).

¹⁴⁹¹ [REDACTED]

¹⁴⁹² Section VII.C.3.

¹⁴⁹³ Section V.C.1.

¹⁴⁹⁴ Appendix L.4.a.

¹⁴⁹⁵ Appendix L.4.a; [REDACTED]

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Content recommendation ads	A form of native advertising that appears as a collection of links that suggest additional external content for users. Publishers tend to place these ad units at the bottom of their pages. ¹⁴⁹⁶
Conversions	A conversion occurs "when someone interacts with your ad or free product listing (for example, clicks a text ad or views a video ad) and then takes an action that you've defined as valuable to your business, such as an online purchase or a call to your business from a mobile phone." ¹⁴⁹⁷
[REDACTED]	[REDACTED]
Cookie	A piece of text that is sent from a website that a user visits to their browser which allow websites to track information about the user, their behavior across websites, and can help to identify unique users across browsing sessions. ¹⁴⁹⁹
CPA	Cost per action
CPC	Cost per click
CPM	Cost per thousand impressions
CPMAV	Cost per mille active view
CPM Bidding	Bidding on a CPM basis
CTR	Click-through rate
DA	Dynamic allocation
DART	Predecessor of DFP. ¹⁵⁰⁰
DBM	DV360, formerly DoubleClick Bid Manager ("DBM"), is Google's DSP
DFP First Look ("DFL")	A Google product that publishers can use to sell inventory ahead of its guaranteed inventory. ¹⁵⁰¹
DoubleClick for Publishers ("DFP")	Google's publisher ad server. DFP is used by publishers to manage, sell, and serve display ads. ¹⁵⁰²
Display ads / banner ads	Image or text-based advertisements that internet users see online. Display (banner) ads may include items such as text, images, video, audio, and often come in a set of predetermined formats and sizes. ¹⁵⁰³
Data management platforms ("DMP")	Products used to assist in the development of advertising content and managing data. ¹⁵⁰⁴
Direct transactions	Transactions that are subject to terms individually and "directly" negotiated between publishers and advertisers. ¹⁵⁰⁵
Dynamic remarketing	Remarketing allows you to show ads to people who have previously visited your website or used your mobile app. Dynamic remarketing lets you show previous visitors ads that contain products and services they viewed on your site. ¹⁵⁰⁶
Dynamic revenue sharing ("DRS")	A Google policy used to vary the revenue share percentage across transactions, while maintaining a certain average revenue share. ¹⁵⁰⁷

¹⁴⁹⁶ Section II.A.¹⁴⁹⁷ Google, "Conversion: Definition," Google Ads Help, accessed December 21, 2023, <https://support.google.com/google-ads/answer/6365?hl=en>.¹⁴⁹⁸ [REDACTED]¹⁴⁹⁹ Section II.A.3 (Audience targeting).¹⁵⁰⁰ Google, "The next generation of ad serving for online publishers," Google Official Blog, February 22, 2010, <https://googleblog.blogspot.com/2010/02/next-generation-of-ad-serving-for.html>.¹⁵⁰¹ Appendix K.2¹⁵⁰² Section II.C.1.¹⁵⁰³ Section II.A.¹⁵⁰⁴ Section II.B.¹⁵⁰⁵ Section II.A.4.¹⁵⁰⁶ Google, "Dynamic Remarketing", Tags, accessed December 21, 2023, <https://developers.google.com/tag-platform/devguides/dynamic-remarketing#:~:text=Remarketing%20allows%20you%20to%20show,they%20viewed%20on%20your%20site>¹⁵⁰⁷ Section II.D.

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[REDACTED]	[REDACTED]
Demand side platform ("DSP")	Products that allow advertisers to manage and submit real-time bids for display inventory through ad exchanges. ¹⁵⁰⁹
Display & Video 360 ("DV360")	Google's advertiser-facing DSP, formerly known as DoubleClick Bid Manager (DBM). ¹⁵¹⁰
[REDACTED]	[REDACTED]
Open Bidding ("OB")	Formerly known as Exchange Bidding ("EB"), a functionality within DFP that allows third-party exchanges to compete with real-time bids against AdX and deals that were subject to Dynamic Allocation without being relegated to the waterfall. Industry participants as well as Google described Exchange Bidding as server-side header bidding administered by Google. ¹⁵¹²
Enhanced Dynamic Allocation ("EDA")	A Google program that allows AdX to bid against direct deals, including those with guaranteed commitments. ¹⁵¹³
EMEA	Europe, Middle East, and Africa
Facebook Audience Network ("FAN")	Facebook product that facilitated advertising transactions to open-web publishers until 2020. Now known as Meta Audience Network, focused on advertising on Meta O&O properties and select third-party mobile apps. ¹⁵¹⁴
First-party data	First-party data is information customers have consented to provide, like an email address or phone number that your business directly collects and owns. ¹⁵¹⁵
[REDACTED]	[REDACTED]
Google Ad Manager ("GAM")	A Google product that contains both DFP and AdX.
Google Campaign Manager ("GCM")	Google's advertiser ad server, formerly known as DoubleClick Campaign Manager or DoubleClick for Advertisers. ¹⁵¹⁷ GCM includes tools for trafficking, reporting, attribution, and verification, allowing advertisers to manage digital campaigns across both web and mobile platforms. ¹⁵¹⁸
Google Content Network ("GCN")	GCN stands for Google Content Network, which changed to Google Display Network in June 2010. ¹⁵¹⁹
[REDACTED]	[REDACTED]
Google Display Network ("GDN")	Google's display ad network, formerly referred to as Google Content Network ("GCN"). GDN consists of an advertiser-facing component, known as Google Ads, and a publisher-facing component, known as AdSense.

¹⁵⁰⁸ [REDACTED]¹⁵⁰⁹ Section II.B.2¹⁵¹⁰ Section II.C.4.¹⁵¹¹ [REDACTED]¹⁵¹² Section II.E.4.¹⁵¹³ Section II.E.2.¹⁵¹⁴ Section II.B.2.b.¹⁵¹⁵ Google, "Use first-party data to power your ad strategy," Google Ads, accessed December 21, 2023, https://ads.google.com/intl/en_us/home/privacy/strategy/¹⁵¹⁶ [REDACTED][REDACTED] See also Google, "Help Center: Cloud Connect > Google Apps, accessed December 21, 2023, https://www.google.com/support/enterprise/static/gsa/docs/admin/70/admin_console_help/cloud_google_apps.html¹⁵¹⁷ Samantha Barnes, "Integrating Google Analytics 360 With DoubleClick Campaign Manager," Bounteous, May 2, 2017, <https://www.bounteous.com/insights/2017/05/02/integrating-google-analytics-360-doubleclick-campaign-manager/>.¹⁵¹⁸ Section II.C.5.a.¹⁵¹⁹ Section V.B.3.a; Google, "Introducing the Google Display Network," Inside AdWords, (June 18, 2010), <https://adwords.googleblog.com/2010/06/introducing-google-display-network.html>.¹⁵²⁰ Section IV.B.2.b; [REDACTED]

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[REDACTED]	[REDACTED]
Dynamic remarketing	Dynamic remarketing allows retailers to show previous visitors ads that contain products and services they viewed on the retailer's site. ¹⁵²²
[REDACTED]	[REDACTED]
Google Analytics	A marketing analytics tool that combines advertiser data with data from Google's ad tech products to provide marketing insights. ¹⁵²⁴
Header bidding ("HB")	Header bidding allows exchanges and other indirect demand sources to compete against each other on the basis of their real-time demand, as opposed to being relegated to a waterfall where they would be ranked on the basis of historical performance. ¹⁵²⁵
IAB	Interacting Advertising Bureau. The trade association that represents the digital advertising community. ¹⁵²⁶
Impression	A single ad shown to a single web visitor. ¹⁵²⁷
Indirect transactions	A method to sell unsold inventory to a large number of buyers in "real-time" after publishers exhausted advertising sold through traditional direct deals. ¹⁵²⁸
Instream video advertising	Instream video ads are shown within a video player on a website, or in applications on mobile devices or connected TVs. Instream video ads are viewed in a video player before, during, or after the original site video content. Instream video ads are distinct from "outstream" or "in-display" video ads, which are videos played in standard display ad spaces and can be substituted in those spaces for "static" images. ¹⁵²⁹
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
Machine learning ("ML")	Machine learning techniques include decision trees, support vector machines, neural nets, deep learning to model complex relationships. ¹⁵³⁴

¹⁵²¹ Appendix K.3. (Google employees evaluated options to "dry out" rival exchanges by adjusting DV360's bidding strategies).

¹⁵²² Google, "About dynamic remarketing: show ads tailored to your site and app visitors," Google Ads Help, <https://support.google.com/google-ads/answer/3124536?hl=en>.

¹⁵²³ [REDACTED]

¹⁵²⁴ Section II.C.5.b.

¹⁵²⁵ Section II.E.3.

¹⁵²⁶ Section II.A.

¹⁵²⁷ Section II.A.1. (Ad tech products for display advertising and their customers).

¹⁵²⁸ Section II.A.4.

¹⁵²⁹ Section II.A.

¹⁵³⁰ [REDACTED]

[REDACTED]

¹⁵³² [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

¹⁵³³ [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

¹⁵³⁴ Hal R. Varian, "Big Data: New Tricks for Econometrics." *Journal of Economic Perspectives* 28, no. 2 (2014).

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Native ads	Ads designed to blend in with the environment in which they are placed. ¹⁵³⁵
[REDACTED]	[REDACTED]
Open Auction ("OA")	A type of auction for indirect transactions that is conducted among a wide set of potential advertisers. ¹⁵³⁸
OTT	Over-The-Top. A service that allows television content to be delivered over the Internet, bypassing traditional TV distribution. This is content "over the top" of the set-top box. ¹⁵³⁹
[REDACTED]	[REDACTED]
Outstream	Videos played in standard display ad spaces that can be substituted in those spaces for "static" images. ¹⁵⁴¹
[REDACTED]	[REDACTED]
pHOB	Predicted highest other bid
Preferred deal ("PD")	A type of programmatic direct transaction where a publisher and an advertiser negotiate on the price for inventory that the advertiser can optionally buy. The advertiser has a "preferred" opportunity to buy the inventory at the negotiated price when there is an ad request for that specific inventory, but is not committed to do so; moreover, the inventory is not guaranteed to be available for the advertiser. ¹⁵⁴³
Programmatic guaranteed ("PG")	A type of programmatic direct transaction where one advertiser and one publisher agree on a fixed price for ad inventory that is then reserved (guaranteed) for the given buyer. ¹⁵⁴⁴
Project Poirot	A Google program first launched in 2017. Involved "bid shading," or reducing advertisers' bids, into ad exchanges that DV360 detected to be deviating from a second-price auction. ¹⁵⁴⁵
Private Auction	A type of auction for indirect transactions that is only open to specific buyers, allowing publishers to control which advertisers are able to bid on their ad inventory. ¹⁵⁴⁶
Programmatic direct	A transaction type that allows publishers to "negotiate direct-sold campaigns while taking advantage of programmatic technology." ¹⁵⁴⁷
Project Bell	A Google program launched in October 2016 as an update to Project Bernanke (adjusting Google Ads' targeted margins when bidding into AdX). ¹⁵⁴⁸
Publisher Ad Server	Software products used by open-web publishers to manage and sell display ad "inventory" (i.e., website ad slot) through transactions that are directly negotiated with advertisers in advance and "indirect" transactions that are sold in "real-time" whenever a user visits a website and new display ad impressions are available for sale. ¹⁵⁴⁹

¹⁵³⁵ Section II.A.¹⁵³⁶ [REDACTED]¹⁵³⁸ Section II.A.4.¹⁵³⁹ Google, "OTT (Over-The-Top)", Authorized Buyers Help, accessed December 20, 2023, <https://support.google.com/authorizedbuyers/answer/7049047?hl=en>.¹⁵⁴⁰ [REDACTED]¹⁵⁴¹ Section II.A.¹⁵⁴² [REDACTED]¹⁵⁴³ Section II.A.4.¹⁵⁴⁴ Section II.A.4.¹⁵⁴⁵ Appendix L.3.b.¹⁵⁴⁶ Section II.A.4.¹⁵⁴⁷ Section II.A.4.¹⁵⁴⁸ Appendix L.4.b.¹⁵⁴⁹ Section II.B.1.

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Retargeting ads	Advertisements that target consumers who have previously visited a website. Retargeting display ads appear on other web sites that the consumer subsequently visits. ¹⁵⁵⁰
ROI	Return on Investment
[REDACTED]	[REDACTED]
Search ads	Search ads are ads shown alongside search results from a search engine and are often linked to a certain search word or phrase. ¹⁵⁵²
Smart Bidding	Smart Bidding refers to bid strategies on Google Ads that optimize for conversions or conversion value. ¹⁵⁵³ Smart Bidding often allows Google Ads' bids to exceed the maximum set by the advertiser for individual auctions so long as Google Ads remains below the maximum on average. ¹⁵⁵⁴
[REDACTED]	[REDACTED]
Soft floor	A price above the hard floor which determines the auction format that is used to sell the impressions. If the highest bid exceeds the soft floor, the impression is sold through a second price auction, with the highest bidder paying the larger of the second-highest bid or the soft floor. ¹⁵⁵⁶
Supply-side-platform ("SSP")	Previous name for ad exchanges. ¹⁵⁵⁷
[REDACTED]	[REDACTED]
Take rate	Ad exchanges typically charge a per-transaction fee. This transaction fee is referred to as a "take rate" or "rev share," which is deducted from payment received by the exchange before being passed along to the publisher. ¹⁵⁵⁹
Third-Party Data	Data that is user information that is purchased or obtained from other sources (as opposed to first-party data as used by that first-party source). ¹⁵⁶⁰

¹⁵⁵⁰ Section II.A.3.¹⁵⁵¹ [REDACTED]¹⁵⁵² Section II.A.¹⁵⁵³ Google, "About Smart Bidding," Google Ads Help, accessed December 21, 2023, <https://support.google.com/google-ads/answer/7065882?hl=en>.¹⁵⁵⁴ Google, "About Target CPA bidding," Google Ads Help, accessed December 21, 2023, <https://support.google.com/google-ads/answer/6268632?sjid=6084683694443905429-NA>.¹⁵⁵⁵ Some in-feed ads can also be shown on non-social media sites. These ads are distinct from display ads because the ad slot blends in with the publisher's content (as opposed to occupying space on top of or around it) and the ad creative matches the aesthetic of the publisher's content. *See* ("Native Advertising Playbook 2.0," *Internet Advertising Bureau (IAB)*, May 2019, https://www.iab.com/wp-content/uploads/2019/05/IAB-Native-Advertising-Playbook-2_0_Final.pdf). *See also* MMA Mobile Native Advertising Committee, "The Mobile Native Ad Formats," *Mobile Marketing Association*, accessed December 20, 2023, https://www.mmaglobal.com/files/documents/the_mobile_native_formats_final.pdf (distinguishing between in-feed (social) and in-feed (content)). In-feed ads can require substantial technical capability and be limited to more sophisticated publishers (*see* [REDACTED]¹⁵⁵⁶ Section III.E.¹⁵⁵⁷ Section II.B.3.¹⁵⁵⁸ [REDACTED]¹⁵⁵⁹ Section II.D.¹⁵⁶⁰ Google, "Data use in personalized ads on Google Search, Gmail and YouTube," Advertising Policies Help, <https://support.google.com/adspolicy/answer/6242605?hl=en>.

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UFP	Unified First Price Auction. ¹⁵⁶¹
Unified Pricing Rules ("UPR")	A Google policy stating that publisher pricing rules "will be applied to all partners equally, and cannot be set for individual buying platforms." ¹⁵⁶²
Value CPM	The value CPM (cost per thousand impressions) is an amount you specify to help Google Ad Manager estimate the value of campaigns. ¹⁵⁶³
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
Yavin	Google's internal name for Demand Product or Ad Connector. ¹⁵⁶⁶
Yield manager	Products that allowed publishers to access and select among bids from multiple demand sources. ¹⁵⁶⁷

¹⁵⁶¹ Section II.E.5.

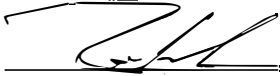
¹⁵⁶² Jason Bigler, "An update on first price auctions for Google Ad Manager," Google Ad Manager Blog, May 10, 2019, <https://www.blog.google/products/admanager/update-first-price-auctions-google-ad-manager/>.

¹⁵⁶³ Google, "Value CPM: Learn how to estimate, set up and report on value CPM," Google Ad Manager Help, accessed December 20, 2023 <https://support.google.com/admanager/answer/177222?hl=en>.

¹⁵⁶⁶ Appendix K.3.

¹⁵⁶⁷ Section VII.A.2.

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December 22, 2023
Date

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